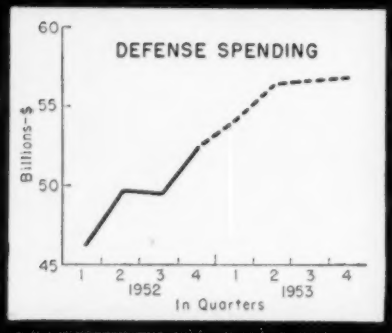
JANUARY
1953

DIGEST



U.S. BUSINESS faces a bright year under the new administration. That is the outlook for the first 6 months of 1953. But there are dark spots too p11

BRITAIN—"The coming year will tell whether the road leads to prosperity or into the 'Crisis of 1955'" p13

ATOMS AND ELECTRONS work for industry. The challenge is great—and so are the rewards p24

DUPONT'S PRESIDENT Crawford Greenewalt. From $36,000 and black powder to $1.5 billion and nylon, Orlon, Dacron, Duco—the story of DuPont p29

WHAT KIND, how much, and when? Management asks these questions to get efficient control of production . . . p38

ECONOMICAL WELDING turns steel, brass, bronze, monel, Nichrome into tough industrial metal cloth of 1,001 uses in automobiles, home appliances . . p56

Biggest PUSH and PULL on earth!

This combination is world-famous for agile power and efficiency: TD-24 diesel crawler and Bucyrus-Erie 16 cu.yd.(struck) capacity scraper.

On big jobs, there has to be a tractor that's tough, powerful, versatile! The answer is an International TD-24 with 148 max. drawbar hp. —more than any other crawler. It has proved its ability to work harder, to get in and out and back in again faster.

The TD-24 has 8 forward and 8 reverse speeds, up to 7.8 mph. for faster time cycles on the job. Syncromesh shifting is "on-the-go" shifting—instant change up or down one speed without declutching. Planet Power steering gives you pivot turns, feathered turns and turns with power on both tracks.

For all the facts on the TD-24, see your International Industrial Power Distributor now.

INTERNATIONAL HARVESTER EXPORT COMPANY

World-wide distributor of products manufactured by the International Harvester Company in the U.S.A. and by affiliated subsidiaries in Canada, the United Kingdom, France, Germany, Sweden, Mexico and Australia.

180 NORTH MICHIGAN AVENUE • CHICAGO 1, U.S.A.

INTERNATIONAL INDUSTRIAL POWER

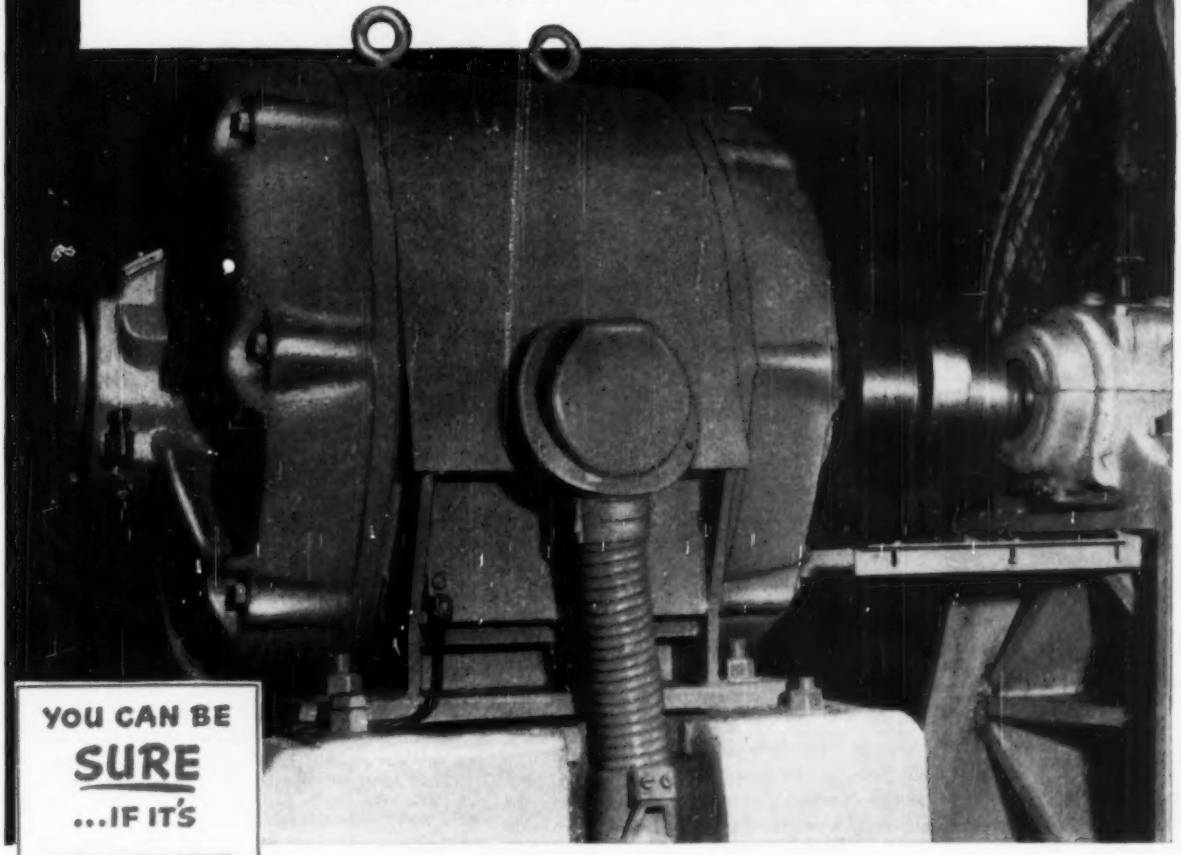
Allied Equipment: *Bucyrus-Erie Tractor Equipment • Pullman-Standard Landclearing and Earthmoving Equipment • Heil Earthmoving Equipment • Superior-Cardwell Sidebooms and Angle-Fillers • M-R-S Diesel Wheel Tractors and Mississippi Wagons Hough Payloaders • Carco Logging Equipment • Brookville Locomotives • Ready-Power Engine Generators*

GOOD NEWS! LIFE-LINE MOTORS NOW IN RATINGS UP TO 700 H.P.

Our 1 to 20 hp Life-Line motors have done such a good job in saving money by cutting operating and maintenance costs for users everywhere that we have extended the Life-Line design to induction motors in ratings from 20 to 700 hp. Built into these new motors is every feature which made the smaller Life-Line models first choice for industrial applications where tough operating conditions place a premium on rugged construction and dependable performance.

Here's what we mean: *Steel frames* that easily absorb punishing shocks and vibration, yet save as much as one-third of the space and weight of other motors . . . *quiet operation* through precision shaft alignment, uniform air gap and dynamically balanced rotor . . . *new stator design* that gives greater electrical and mechanical strength . . . *maximum protection* against dust, dirt and moisture. Standard horizontal and vertical mountings . . . special mountings available to fit your needs.

For heavy-duty assignments in sugar mills, lumber mills, cement mills, coal tipples, gravel plants, rock crushers and power stations, take a second look at Westinghouse Life-Line induction motors from 20 to 700 hp. Write for your free copy of informative booklet B-4731, today.



YOU CAN BE **SURE** ...IF IT'S

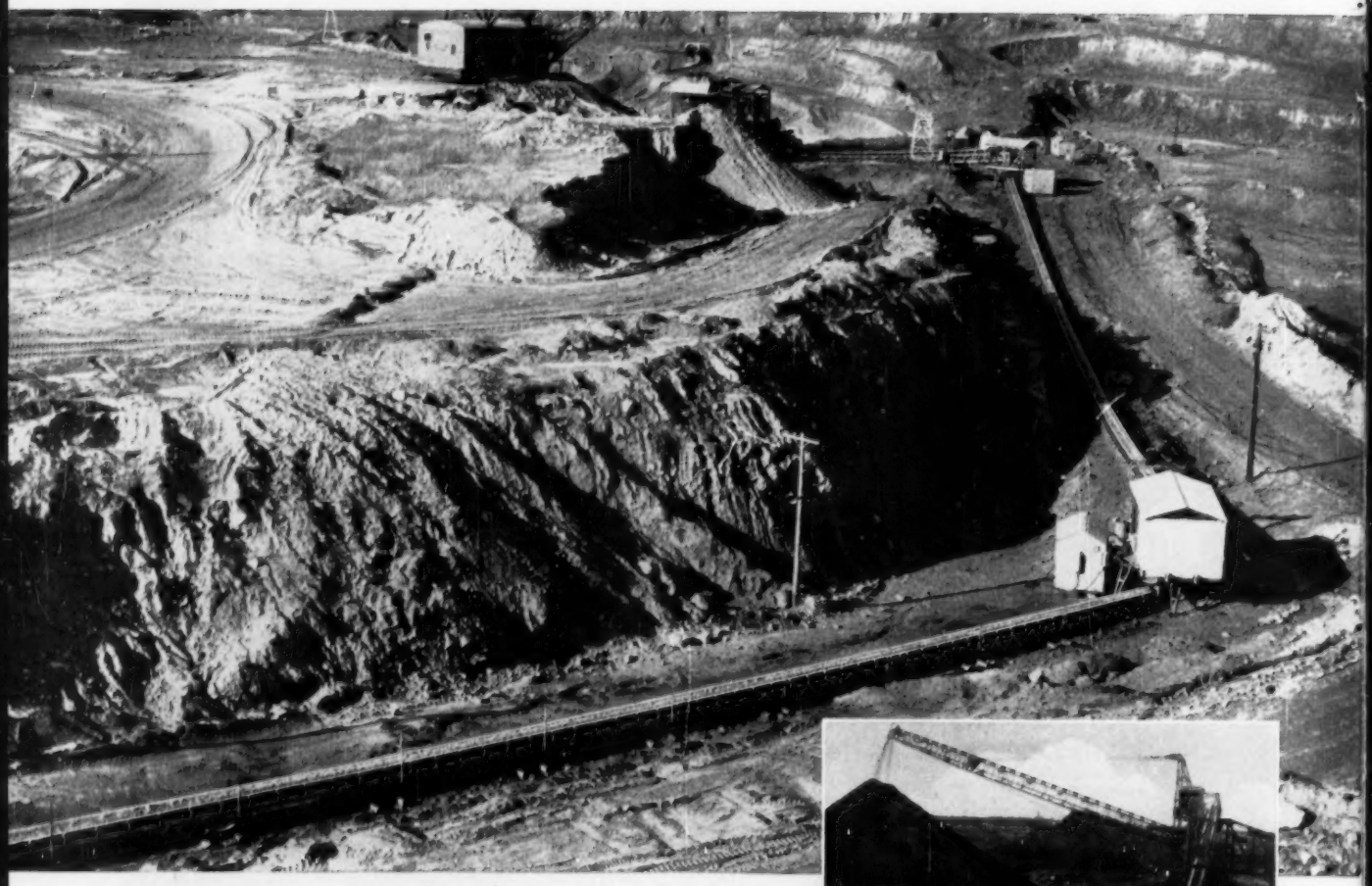
Westinghouse

WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY

40 Wall Street, New York 5, U. S. A.

LINK-BELT research and engineering . . . . Working for Industry

50 million pounds of overburden a day take this 10-minute ride out of the pit



LINK-BELT conveyor systems prove most efficient means of transportation in modern metal mining

FROM the pits of the Mesabi Iron Range, Link-Belt conveyor systems — up to several miles long — carry out, first the overburden, then the rich, red ore.

Because they rise directly from the mine-bottom, up steep inclines, they save miles of costly right-of-way around the edges of the pit that would be needed for other means of transportation. Efficient, 'round-the-clock movement of materials . . . with no loss of time for empty return trips . . . assures high-capacity, low-cost handling.

In the production of almost every metal, Link-Belt conveying and preparation plant equipment is utilized. And you'll find widespread evidence of Link-Belt research and engineering in the processing of all of America's natural resources. From farms and forests to mills and factories, Link-Belt materials handling and power transmission products touch almost everything we eat, wear and use in daily living.

At another pit, Link-Belt self-propelled stacking belt conveyor stockpiles iron ore at 600 long tons per hour. Its 115 ft. radius and 570 ft. travel provide huge storage facilities.

12.873-E

LINK-BELT

LINK-BELT COMPANY
Engineers • Manufacturers • Exporters of Conveying and Power Transmission Machinery • Established 1875.

EXPORT DIVISION
2680 Woolworth Bldg., New York 7, U.S.A.
Cable Address: Linkbelt—New York.
Representatives listed on opposite page.

ONE SOURCE...ONE RESPONSIBILITY FOR MATERIALS HANDLING AND POWER TRANSMISSION MACHINERY

LINK-BELT

Representatives Throughout the World

Angola, Azores, Madeira Islands—Alfredo Alves & Ca. (Filhos), Lisbon, Portugal
Argentina—General Electric S.A., Buenos Aires and Rosario
Australia—Link-Belt Company Pty. Ltd., Sydney • Malleable Castings Pty. Limited, Marrickville
Belgium, Luxemburg & Belgian Congo—Fabricom, S.A., Brussels
Brazil—Cia. Importadora de Maquinas "Comac", Rio de Janeiro and Sao Paulo • Figueras S/A. Engenheiros & Importadores, Porto Alegre, Pelotas, Florianopolis and Cachoeira do Sul • Oscar Amorim, Comercio S/A., Recife and Natal
British Guiana—J. N. Harriman & Co., Ltd., Port-of-Spain, Trinidad, B.W.I.
Canada—Link-Belt Limited, Toronto, Montreal, Vancouver, Winnipeg, Swastika, Hamilton, Elmira, Halifax
Canal Zone—Agencias Lumina, S.A., Panama
China—Li Ya Industrial Development Corp. (H.K.) Ltd., Hong Kong
Chile—Gildemeister & Co., Ltda., Santiago, Coquimbo, Ovalle, Valparaiso, Concepcion, Victoria, Temuco, Valdivia, Rio Bueno, Osorno, Puerto Varas, Puerto Montt, Punta Arenas
Colombia—Representaciones Ospina Perez, Ltda., Medellin, Cali and Barranquilla • Ospincon Ltda., Bogota
Costa Rica—Grace & Co., C.A., San Jose
Cuba—Woodward, Gilbert & Cia., Havana
Denmark—Hakon Gertsen, Copenhagen K
Dominican Republic and Haiti—F. A. Ortiz & Co., Inc., San Juan 5, Puerto Rico
Ecuador—Ferrum, S.A., Guayaquil & Quito
El Salvador—Grace & Co., C.A., San Salvador
England—Watveare Overseas, Ltd., Devonshire (Agricultural Chains only)
Finland—Industria Osakeyhtio, Helsingfors
France—C. Comiot, Paris
Greece—The Hellenic Technical Supply Co., Athens
Guadeloupe, F.W.I.—Pierre Langlois Corp., Pointe-A-Pitre
Guatemala—Grace & Co., C.A., Guatemala
Hawaii—Honolulu Iron Works Co., Honolulu; Hilo Iron Works, Hilo
Hong Kong—Li Ya Industrial Development Corp. (H.K.) Ltd., Hong Kong
Iceland—Velsmidjan Hedinn Ltd., Reykjavik
India—Kilburn & Co., Ltd., Calcutta, Bombay, New Delhi, Madras, Kanpur
Israel—Manfred Gottesmann, Tel Aviv
Italy—Trione Ricambi, S.p.A., Turin, Milan and Rome
Jamaica—Reginald Aitken Ltd., Kingston
Malaya—United Engineers, Ltd., Ipoh, Kuala Lumpur, Malacca, Seremban, Penang
Martinique—M. & E. Hayot, Fort-de-France
Mexico—The General Supply Co., S.A. Mexico, D.F. • Gustavo Rodriguez, Monterrey, N.L.
Netherlands—J. H. Kimman's Technische Handelmaatschappij, N. V., Rotterdam
New Zealand—Dominion Sales Corp., Ltd., Auckland, Wellington, Christchurch, Dunedin
Nicaragua—Grace & Co., C.A., Managua
Norway—Welhaven & Co., A/S., Oslo
Pakistan—Kilburn & Co. (Pakistan) Ltd., Karachi, Lahore and Chittagong
Panama—Agencias Lumina S.A., Panama
Paraguay—Sociedad Anonima Comercial Manuel Ferreira, Asuncion
Peru—Gross Equipment S.A., Lima and Arequipa
Philippine Islands—The Earnshaws Docks & Honolulu Iron Works, Manila, Bacolod and Cebu
Portugal—Alfredo Alves & Ca. (Filhos), Lisbon and Oporto
Puerto Rico and Virgin Islands—F. A. Ortiz & Co., Inc., San Juan 5, Puerto Rico
Singapore—United Engineers Ltd., Singapore
Surinam—N. V. Ingenieursbureau H. N. Van Dijk, Paramaribo, New Nickerie
Sweden—Aktiebolaget Fr. Ramstrom, Harnosand and Stockholm
Switzerland—Wilhelm Pluess, Zurich 1
Taiwan—Li Ya Industrial Development Corp. (H.K.) Ltd.
Thailand (Siam)—International Engineering Co., Bangkok
Trinidad, British Guiana, Barbados, Antigua, St. Kitts, Grenada, St. Vincent, St. Lucia, Tobago—J. N. Harriman & Co., Ltd., Port-of-Spain, Trinidad, B.W.I.
Union of South Africa, Southwest Africa, Northern Rhodesia, Southern Rhodesia, and Mozambique—Link-Belt Africa Limited, Springs, Transvaal • Edward L. Bateman Ltd., Johannesburg, Durban and Bulawayo, S. R.
Uruguay—General Electric S.A., Montevideo
Venezuela—Ortiz & Mejia C.A., Caracas
Western Samoa, Fiji and Tonga—Fletchers (South Seas) Limited, Apia

McGRAW-HILL DIGEST

Volume 8 | January 1953 | Number 1

FEATURES

U. S. Business Outlook for 1953 11
Britain on the Road Back? 13
U. S. Foreign Trade Rides High 15
Lithium: Growth Ahead 18
Garbage to Compost — 7 days 21
Atoms and Electrons Go to Work 24
Pioneer in Foreign Know-How 29
Improved Water Treatment 36
What Is Production Control? 38
Accent on New Styles 49
Adsorption Comes of Age 54
Seam-Welding Metal 56

AVIATION, TRANSPORTATION

Saucerships for Space 22
Plane Seating 40
Choosing the Right Truck 52

CHEMISTRY, METALLURGY

Study Gamma-Radiation Effects 17
Chemicals for Rio 22
Styrene Gets Muscles 27

CONSTRUCTION

Activated Sludge Plant 20
Porcelain Goes Structural 35
World's Biggest Sphere 52

ELECTRICITY, POWER

Aluminum Panels for Heating 27
Amines Cut Corrosion 40
Aluminum Feeders 48

ELECTRONICS

Ultrasonic Therapy Unit 20
Oil-Well Electronics 51
Latest Disk-Cathode 57

FOOD PROCESSING

Shipping Orange Juice 20
Renders Meat Fat 40
Graphic-Panel Control 57

METALWORKING

Nitrogen Doubles Tool Life 40
Electrolytic Grinding 42
Continuous Casting of Steel 48

MINING, PETROLEUM

Dunkirk Refinery Opens 48
PM Adds to Production 53
Commercial Taconite 56

PLANT MANAGEMENT

Improve Employee Relations 17
Program Trains Supervisors 37
Try Making Smell Work 39

TEXTILES

For Large-Package Yarns 18
Identifies Cotton 35
New Slasher for Cotton 48

DEPARTMENTS

Business Trends 7
Washington Report 9
This Month's How To 17
Technical Shorts 35
New Products 44
Free Literature 58

Harry S. Wharen, *Editor* | **Joseph A. Cohn**, *Assistant Editor* | **Arthur R. Poutray**, *Assistant Editor* | **W. Howe Sadler**, *Publications Manager*

Dexter M. Keezer, *Economics Dept.* | **J. K. Van Denberg, Jr.**, *Editor, World News* | **George B. Bryant, Jr.**, *Washington Bureau* | **Boyd France**, *Washington Bureau*

January 1953 McGRAW-HILL DIGEST Vol. 8—No. 1

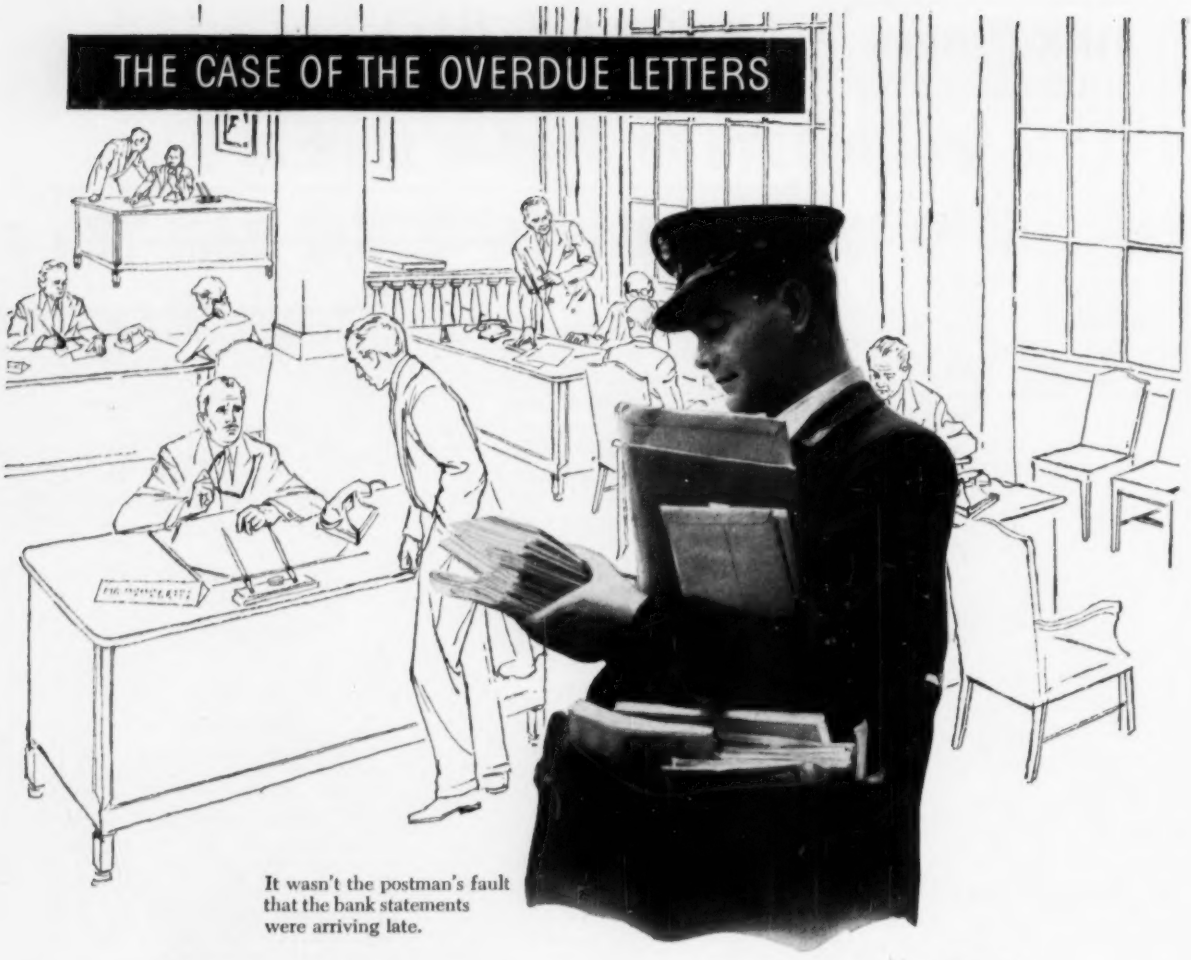
Member — Audit Bureau of Circulations

Published monthly by McGraw-Hill International Corporation for circulation in all countries of the world except the United States and Canada. *Publication office:* 99-129 North Broadway, Albany 1, N. Y., U. S. A. *Executive and editorial offices:* 330 West 42nd St., New York 36, N. Y., U. S. A. Curtis W. McGraw, Chairman of the Board; Willard T. Chevalier, President; Eugene P. Warner, Senior Vice-President; Joseph A. Gerardi, Treasurer; John C. Cooke, Secretary; J. C. Stark, Vice-President Publications Division; K. Presbrey Bliss, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Director of Circulation.

Subscriptions may be ordered through Director of Circulation, through local book dealer, or McGraw-Hill Publishing Co. Ltd., McGraw-Hill House, 95 Farringdon St., London, E. C. 4 (British only). Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy 50¢ (U. S. currency). Entered as second-class matter January 1, 1953, at the post office at Albany, N. Y., under the Act of March 3, 1879.

Copyright, 1952 by McGraw-Hill International Corporation, 330 West 42nd Street, New York 36, New York. Reproduction of items in full or part without written permission prohibited in all parts of the world.

THE CASE OF THE OVERDUE LETTERS



It wasn't the postman's fault that the bank statements were arriving late.

"Every day they were delayed!"

Even before World War II, business for the Kredietbank in Belgium had greatly increased. After the war, new business came in so fast that the managers of the bank faced new problems.

Messrs. Vandervelde and Vandersnickt (left) of the Kredietbank, Belgium, watch a demonstration of the Burroughs Sensimatic. With them, Messrs. Wullaert (seated) and Beynon, Burroughs men who helped solve the Case of the Overdue Letters.

In the bank's head office at Brussels and in its offices at Antwerp, Bruges, Courtrai, Ghent and Hasselt, the mailing of customer statements was lagging. If these late mailings continued, dissatisfaction might well result.

But what to do? The Burroughs equipment, successfully used in prewar years, could not keep up with the new business. The department in charge of office organization was alerted. They called the Burroughs specialists.

Together the department and the Burroughs men studied the problem—then installed a day-by-day system for crediting or debiting, calculating and verifying interest on each account. This system also included a running balance of capital and interest. For greatest efficiency and economy, new Burroughs Bookkeeping Machines were ordered.

Result? Before installing the new system and machines it took several weeks to compute and credit or debit interest, balance, re-open accounts, prepare and mail customer statements and prepare trial balances. Now it takes only *5 or 6 days. Fast service is winning the bank even more business!*

What about you? For faster figuring, call the Burroughs Man. Burroughs makes the world's broadest line of modern machines for business recordkeeping: Adding, Calculating, Accounting, Billing and Statistical, Cash Registers.

Burroughs Adding Machine Co., Detroit 32, Michigan, U.S.A.

FOR EXPERT ADVICE IN ANY FIELD OF BUSINESS FIGURES...

CALL THE **Burroughs** MAN

Rely on the world's largest source

for TALL OIL...

Economical
Versatile
Readily available

Arizona Chemical Company specializes in the manufacture of tall oil and tall oil fractionation. Its modern plant employs equipment and procedures which incorporate the most advanced methods of fractionating. It is the world's largest producer of high quality tall oil and tall oil fractionated products.

ACINTOL® Tall Oil Products are economical—since the raw material is free from the many rapidly changing factors that affect other fatty acids and rosins, which are subject to wide price fluctuations.

ACINTOL Tall Oil Products are versatile—and are offered in a range of grades wherever a reliable source of rosins or fatty acids is required, for use, for instance, in the manufacture of such varied products as soaps, emulsifying agents, paints and varnishes, greases, linoleum, fungicides, printing inks, in ore flotation and in core oils used in metal castings.

ACINTOL Tall Oil Products are available—because Arizona's volume production of highest quality tall oil and tall oil fractions assures you swift delivery of the quantities you desire.

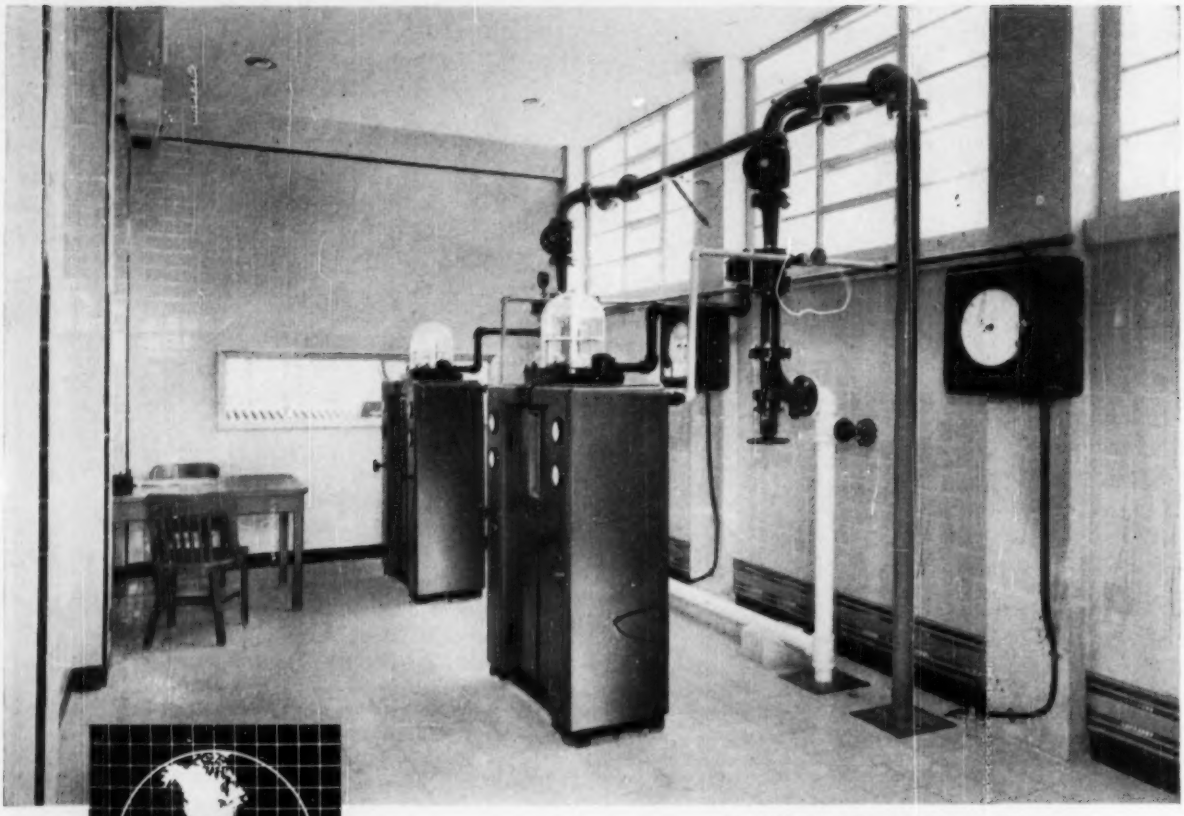
Arizona products offered through American Cyanamid Company as sole export agent are:

ACINTOL C Crude Tall Oil—a high quality crude tall oil of uniform composition;
ACINTOL D & DLR Distilled Tall Oils—with low unsaponifiables;
ACINTOL R Tall Oil Resin—the only solid tall oil rosin of its high quality available commercially.
ACINTOL FA #1 & FA #2 Tall Oil Fatty Acids—outstanding tall oil fatty acids with low unsaponifiables and low rosin.

Write for specifications and prices.

AMERICAN *Cyanamid* COMPANY
30 Rockefeller Plaza, New York 20, N. Y.
Representatives Throughout the World

Products are offered in all countries except under adverse government-controlled patent rights.



Two W&T Air Operated Master Chlorinators
in the Lerma project, Mexico City

Internationally Dependable . . .
. . . *W & T Equipment* for the COMMUNITY

Through the years, and in many countries throughout the world, Wallace & Tiernan processes and equipment have contributed to the protection of community life.

Mexico City, the capital of Mexico, is an excellent example of how a civil administration, with the aid of W&T equipment, helps to safeguard the health and welfare of its citizens.

Recognizing that the availability of a safe water supply is a major responsibility to its community, the Mexican capital executed the fabulous Lerma project. Completed recently, after nine years of construction, at a cost of $25,000,000, this new project is capable of supplying 1,584 gallons of water per second. Water is brought from the headwaters of the Lerma River to storage tanks outside the city through an aqueduct which includes some seventeen tunnels.

Two Wallace & Tiernan Air-Master Chlorinators are installed in the Lerma project to insure adequate sterilization.

Wallace & Tiernan Chlorinators are well known internationally for dependable, economical performance. W&T's successful performance in the Lerma project is typical of the thousands of other installations all over the world.

Write today, without obligation, for technical literature on W&T Chlorinators for every municipal and industrial need.

WALLACE & TIERNAN PRODUCTS FOR COMMERCE, INDUSTRY AND THE COMMUNITY

Ammonia Control Apparatus — Cathodic Protection Systems — Chlorinators — Chemical Feeders — Decay Control Processes for Produce — Electric Marine Beacons — Flour Processing Chemicals — Magnetic Separators — Pharmaceuticals — Precision Instruments — Sifters. F-91

AGENTS IN MOST COUNTRIES

WALLACE & TIERNAN CO., INC.

NEWARK 1, NEW JERSEY, U. S. A.

BUSINESS TRENDS

U. S. BUSINESS has never been more active—at least not in any period other than a full-scale war. Industrial production is setting a peace-time record. Unemployment is low. Fourth-quarter 1952 profits before taxes were close to the all-time high reached in the fourth quarter of 1950. And business promises to continue at record levels through the first half of this year.

Prospects for the second half of 1953 are less encouraging. The leveling off of defense and business capital expenditures—expected sometime after mid-1953—could mark the beginning of a general business letdown. (For a broader view of the business outlook for 1953, see p11.)

When businessmen and economists are so optimistic about general business prospects, at least over the short run, it pays to take a close look at the prospects for particular industries.

Business activity for 2 years has remained high over-all, only because upswings in some lines have compensated for downswings in others. This kind of "seething stability" may well continue in 1953.

The industries, in general, with the best outlook this year are those making highly fabricated products rather than basic materials. The big buildup in supplies of raw materials for defense production is just about completed. Many industries making these materials have added so much to their capacity that they can now produce more than the economy can absorb.

The steel industry is a case in point. Output will stay high for several months as inventories that were depleted during the steel strike get back to normal.

But the industry does not expect to sell more than 105- to 110-million tons of steel this year. So production will probably begin to slide after the first quarter. By the fourth quarter, it may be at a rate of 100-million tons or less.

Copper, lead and zinc production usually follow steel because these metals are used with steel in industrial and consumer products. But production of nonferrous metals could drop both sooner and lower than steel because inventories were built up during the steel strike. Also, their world supply is becoming more plentiful.

Aluminum output will probably continue to rise throughout the year. Aircraft demands for aluminum will rise. And aluminum has found many new uses by replacing other materials.

Industrial-chemical sales will continue up in early months, then taper off. But continued expansion in such growth products as plastics, synthetic fibers, and petrochemicals will probably enable the industry as a whole to register some important gains over last year.

Coal mines have had trouble with over-production for almost a year. Loss of foreign markets, competition from oil, and large stockpiles above ground all point to a further decline in coal production this year.

Strongest capital-goods industry is electrical machinery. The output of power generating equipment will increase to meet the demands of electric-utility expansion. And output of other heavy electrical goods will stay close to 1952's fourth-quarter level.

Industrial-equipment makers still have substantial backlogs; but output is high, indicating that the backlogs could easily be lowered in the next few months. In addition, a lower level of new orders can be expected. Output will probably drop gradually in the second half-year.

Farm income this year is expected to be a bit lower than in 1952, but inventories of farm equipment are down. So farm-equipment production may continue near present level.

Automobile production rate at the end of 1952 was about 6-million cars per year. Industry estimates of car sales for 1953 range around 5-million. Production is likely to stay high in the first half of this year since spring is the industry's strong selling period. Then it may drop sharply.

Appliance production, which slumped badly in early 1952, is now back to an exceptionally high rate, mainly because consumers are buying more on credit. But a slowdown of installment buying in mid-1953 may pinch sales and output. This will hit the big production items like refrigerators and washing machines the hardest.

All industries taken together, some further rise in output is possible during the next few months. But in the second half-year the Federal Reserve index could easily drop below the 220 level that it averaged during most of 1951-52.

This caution, however, applies primarily to manufacturing. The utilities, transportation and service industries all expect to handle more volume in 1953. Government spending during most of the year will be rising. Agriculture and construction activity will run near present levels. So economic activity as a whole may not be much, if any, lower by the end of this year.

TYPE DU
ELECTRIC DRILL

HITACHI'S ELECTRIC TOOLS

TYPE LU ELECTRIC DRILL

TYPE NU ELECTRIC DRILL

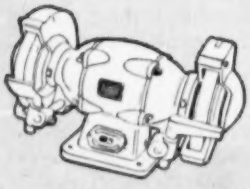
TYPE RUS PORTABLE
FLEXIBLE DISC SANDER

The results of more than 20 years of experience

TYPE NLU
PORTABLE ELECTRIC GRINDER

ELECTRIC DRILLS BENCH DRILLS PORTABLE
ELECTRIC GRINDERS TOOL POST GRINDERS
BENCH GRINDERS PORTABLE ELECTRIC SAWS
PORTABLE FLEXIBLE DISC SANDERS ADJUSTABLE
CLUTCH NUT RUNNERS ELECTRIC TAPPERS
BENCH POLISHERS PORTABLE ELECTRIC BLOWES

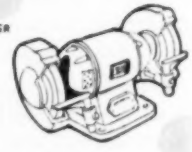
TYPE NUN ADJUSTABLE
CLUTCH NUT RUNNER



TYPE ABT
BALL BEARING BENCH GRINDER

TYPE PB PORTABLE
ELECTRIC BLOWER

TYPE APT OR LPT
BALL BEARING BENCH POLISHER



TYPE GBS BALL
BEARING BENCH GRINDER

Hitachi, Ltd.

Tokyo Japan

Cable Address: "HITACHY" TOKYO (All Codes Used)

SALES OFFICES:
OSAKA, FUKUOKA, NAGOYA,
SAPPORO, SENDAI.

WASHINGTON REPORT

FOREIGN ECONOMIC POLICY will be Eisenhower's toughest problem in the first year of his administration. The two wings of the Republican Party are widely split in this field.

Eisenhower and Taft probably will be able to hammer out a working compromise on the political and military aspects of foreign policy—at least during the honeymoon period.

But a clash will come over things like foreign economic aid, tariffs, customs simplification, "Buy America" legislation, stabilization of foreign currencies and world commodity markets, public investment abroad.

Eisenhower is convinced of the need for action in these fields to maintain the unity of the non-Communist world. And he will be under heavy pressure from many influential Republican leaders and organizations to reform U. S. foreign economic policy in order to close the dollar gap without indefinite economic aid.

But Taft as spokesman for Midwestern and Western protectionist-minded industrialists has voted stubbornly against any trade liberalization for a decade. He is not likely to change his views much now.

John Foster Dulles appointment as Secretary of State shows that Eisenhower is not underrating the danger of a showdown fight with Taft. Dulles was the leading symbol and architect of Republican unity during the campaign.

First big diplomatic job facing Dulles will be as ambassador to Congress. He will try to win Taft's support for Eisenhower's foreign policy.

The question is whether even the most skillful diplomacy can unite Taft and Eisenhower behind an effective foreign policy. The administration could by-pass Taft, of course, and get its foreign policy through Congress with the help of Democrats. But that is not likely.

Two tests of how far and fast Eisenhower will be able to go in forging a foreign economic policy will come early in the year:

1. **London and Paris** will press for an Atlantic economic conference next spring. Reaction of the new administration to this proposal will show which way the policy may go.

2. **Reciprocal Trade Act** comes up for renewal in June. Hearings will get under way in February or March. Then you will be able to see the strategy of Taft Republicans.

Foreign economic aid will be a headache, even if Eisenhower puts through reforms in general foreign economic policy. Some aid will be needed next year as a stop-gap until the new measures begin to take effect. And some countries that are carrying heavy military burdens, like Greece, Turkey and Formosa, will need economic help for years to come. India is another special case.

One thing could reduce wrangling over foreign economic policy to insignificance—a new crisis in Korea. And that begins to look more likely.

General Mark Clark has asked Eisenhower for three new U. S. divisions plus equipment for two extra South Korean divisions for a new offensive in the spring. Clark figures the Chinese are short on reserves, could be forced to sue for peace by an all-out drive.

Eisenhower will get contrary advice from the Joint Chiefs of Staff. And he will hesitate before getting more men tied down in Korea and risking expansion of the war. But he cannot let the Korean war drag on indefinitely. Truce negotiations now look bogged down for good.

It is still too early to tell what specific changes in over-all foreign policy Eisenhower and Dulles will make. But here are the best informed guesses:

- **The containment policy** will get some new teeth. Propaganda and espionage behind the Iron Curtain will be stepped up. Some arms may even be sneaked in to potential saboteurs. But you can forget loose talk about attempts to liberate satellites any time soon. The new administration will be too hard-headed for that.

- **New Communist aggressions** probably would be met by counter-attacks rather than resistance at the point of attack. A Chinese drive into Indochina, for example, would draw direct air and naval retaliation against China, perhaps a U. S. supported invasion of China by Chiang Kai-shek's troops. Chiang might also be helped to make hit-and-run attacks on the China coast to divert Communist strength from Korea.

- **Asia will get** more attention, from now on, Europe less. It is fear on this point that has European government officials worried.

- **Three foreign-economic measures** are almost sure to be put into effect next year: (1) The proposed International Finance Corporation (McG-H Digest, July '52, p 19); the World Bank finally has backed the project officially. (2) Tax cuts on income earned abroad designed to boost U. S. private investment overseas. (3) Higher subsidies for the U. S. merchant marine.

with

DOW *latexes*

There is a tremendous consumer demand for the new latex paints in home and industry. And no wonder—these new paints made with Dow latexes are easier to apply, free from the usual paint odor and extremely fast drying.

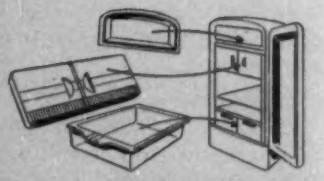
Your paints can enter this popular latex market, too, carrying the advantage of superior Dow latexes—always dependable in quality.

In the paper industry manufacturers have found that Dow latexes enable them to give their products a variety of finishes that assures the very finest surface for reproduction.

We invite your inquiries regarding Dow latexes and the potential in sales and product improvement it offers you. Write TODAY for complete information.

DOW produces more than 600 chemicals including industrial and agricultural chemicals . . . fine chemicals for the pharmaceutical industry . . . chemicals basic to progress and industry.

LOOK TO DOW for high quality chemicals



PLASTICS

Styron (Dow polystyrene) is a thermoplastic material widely used to manufacture such items as lighting fixtures, radio cabinets and household refrigerator parts. Other valuable Dow plastics include Ethocel (Dow ethylcellulose), a tough plastic that combines lightness with good shock resistance; Saran for extruding and weaving into seat covers and screens; Saran film used for attractive packaging.

AGRICULTURAL CHEMICALS

To help farmers raise more and better crops and livestock, Dow manufactures such products as weed and grass killers, insecticides, fungicides, soil and grain fumigants, plant growth regulators and veterinary chemicals. Extensive research and expanding production by Dow are furthering agricultural progress all over the world.

DOW CHEMICAL INTERNATIONAL LIMITED

Offices at: **Midland, Michigan, U. S. A. Cable: Dowintal**
Zurich 2, Switzerland

DOW CHEMICAL INTER-AMERICAN LIMITED

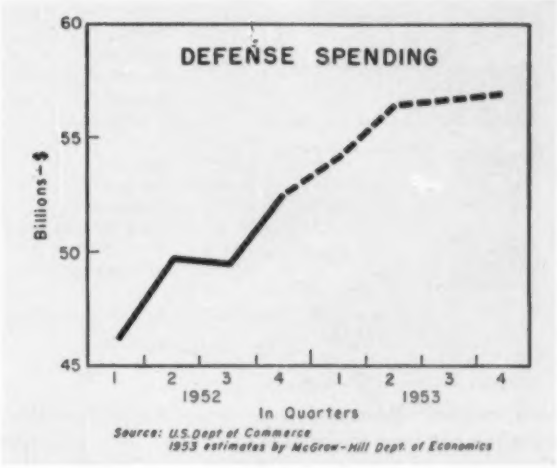
Offices at: **Midland, Michigan, U. S. A. Cable: Dowpanam**
Montevideo, Uruguay

JANUARY 1953
VOLUME 8 • NUMBER 1

McGRAW-HILL
DIGEST

- Defense Spending
- Business Expenditures
- Construction Volume
- Consumer Spending

are keys to . . .



U. S. Business Outlook for 1953

BUSINESS PROSPECTS in the U. S., as Eisenhower and his new administration take over, appear bright well into 1953. Four main elements of strength promise to keep the economy operating at a high level, at least through the first half of 1953:

• Defense spending will continue to mount to a peak of $56- or $57-billion in mid-1953, then level out.

• Business expenditures for new plant and equipment will remain high—within about 2 to 5% of 1952's record $27.5-billion.

• Construction volume will be about the same as in 1952.

• Consumer spending appears to have recovered from the decline that caused so much concern in much of 1951 and early 1952.

1. Defense spending, according to Truman's original budget proposals for fiscal 1953, was to reach a peak rate of $65-billion by the middle of this year. Congressional budget cuts and the much-publicized defense stretchout have brought this target down by almost $10-billion.

2. Business expenditures by private industry will be high for new plants and equipment in 1953. Manufacturing industries will spend less than in 1952, and non-manufacturing industries more. So total expenditures may only be down 2 to 5% from 1952, according to a preliminary survey conducted by McGraw-Hill in October (McG-H Digest, Dec '52, p9).

Manufacturing industries, where the build-up in capacity has been greatest, still have impressive plans for new plants and equipment. Plans indicate that spending will be down about 8% from 1952, when $12.8-billion was spent. This is still 5% more than was spent in 1951.

But the total conceals wide divergencies among industries. Considerably less will be spent by the steel, automobile, transportation equipment and chemical industries. The ever-expanding oil companies, which increased their expenditures by $800-million in 1952, plan to spend another 5% more in 1953. Electrical manufacturers and food processors expect to spend more money this year also.

Non-manufacturing industries are expected to increase their spending in 1953. Private electrical utilities may increase their spending from $2.6-billion in 1952 to $3-billion in 1953. Large increases are also expected by gas utilities. Commercial business may well invest 5% more in 1953 than in 1952. And mining companies are likely to spend at least as much in 1953 as in 1952.

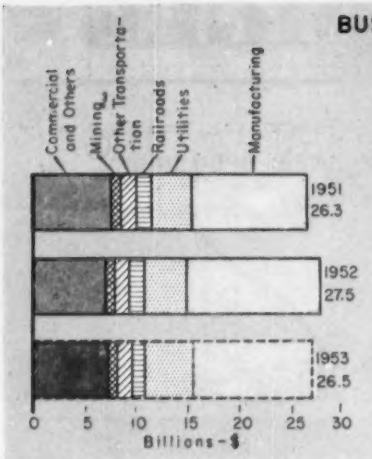
3. Construction volume is the third strong factor in the business picture. The total volume for new construction in 1953 will probably match the record $32-billion spent in 1952.

The big question mark is private residential building. Right now, the forecast is for 900,000 to 950,000 housing starts in 1953. The 1952 total was over a million. That may involve a drop of close to $500-million.

Private non-residential construction will be about the same as 1952—$4.8-billion—with industrial construction down but the rate for commercial and farm construction up. Total public construction will be up $800- to $900-million.

4. Consumer spending through the first half of 1953 should be good, but this prospect must be viewed

BUSINESS SPENDING PLANS FOR 1953



Industry	Actual 1951	Estimated 1952	Planned 1953	% Change 1952-1953
Steel	1,304	1,718	1,428	-17
Machinery	675	773	661	-14
Electrical Machinery	359	407	468	+15
Automobiles	736	909	791	-13
Transportation	182	229	144	-37
Food	968	933	998	+ 7
Textiles	695	491	417	-15
Petroleum	2,014	2,812	2,967	+ 5
Chemicals	1,283	1,503	1,301	-13
Other Manufacturing	2,904	3,033	2,578	-15
All Manufacturing	11,130	12,808	11,753	- 8

Data: U.S. Department of Commerce; estimates by McGraw-Hill Department of Economics.

with caution. Recently, consumer spending has been the least predictable element in the business picture. After early 1951, despite high and rising national income, the consumer cut his spending drastically.

At present, it looks like consumers have both the desire and the ability to make substantial expenditures in 1953. A preliminary survey of consumer intentions indicates that consumers already have tentative plans to buy a substantial number of automobiles, other durable goods, and houses.

Consumer credit has been rising at a faster rate than in any period except during the post-Korean buying spree. Credit rose about a billion dollars over the last few months. And it could rise $2- to $3-billion more in 1953, even if national income does not go much above present levels. In addition to going into debt, consumers have $190-billion of personal holdings available to finance their purchases. But what consumers will do with their money is simply unpredictable.

Prospects for the second half of 1953 appear somewhat less glittering than those for the first half. Some businessmen and economists fear that once the defense program levels off, even though many months of high spending remain ahead, there may be a drop in defense-induced capital expenditures.

Such a drop would tend to depress national income unless capital outlay in other sectors of the economy picked up the slack. A drop in national income, in turn, might persuade consumers to hold on to their money.

To add to these potential difficulties, American manufacturers can no longer depend on foreign markets as they have in the past. In 1950, for instance, manufacturers of machine tools and textile machinery sold over 20% of their production abroad. Payments problems and increased production abroad will keep U. S. exports from rising much through 1953 (page 15).

But there is every reason for long-term optimism about the U. S. economy. Businessmen are becoming increasingly aware of the benefits of plant modernization. And there is room in American industry for considerable modernization.

New products and new designs will stimulate industry's demand for capital equipment. Color television, ready to leap from laboratory to living room, is a prime example. Home air-conditioners, virtually unheard of a few years ago, are now being produced and sold in increasing numbers.

Radical changes in automobile design will whet the consumer's appetite for the latest model. In the fields of chemicals and electrical machinery, over 60% of the companies replying to a recent McGraw-Hill survey said that they plan to build capacity for *new* products in 1953-1954 and 1955. The salesman will play the star role in bringing these new products and new processes to the American producer and consumer.

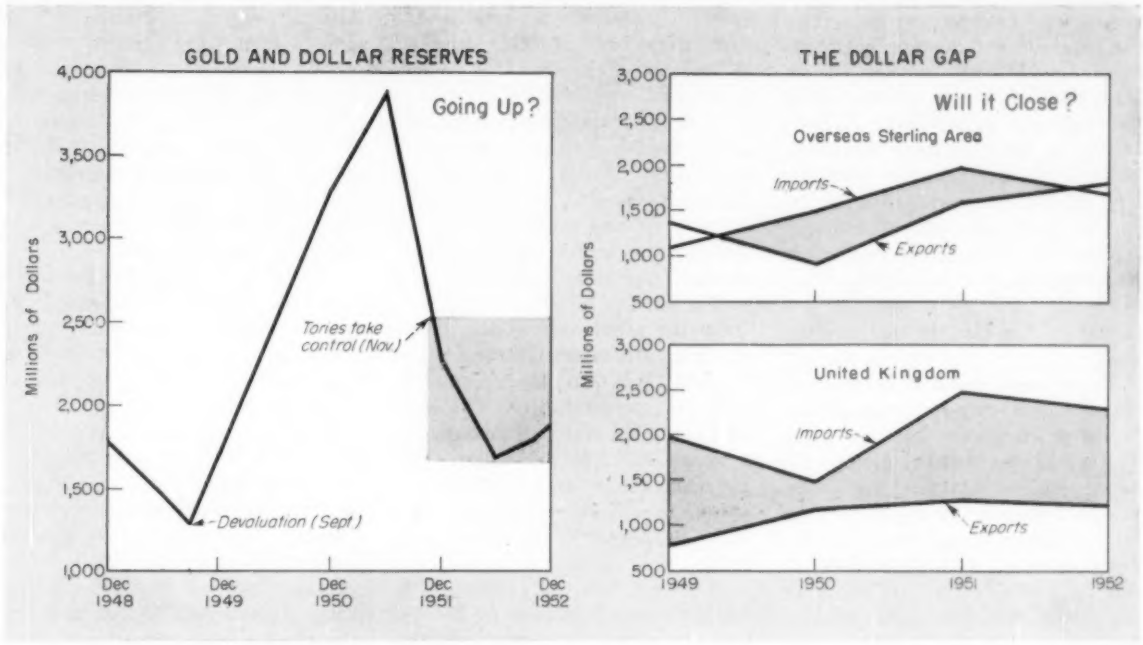
The end of the constantly rising defense program should not be viewed with alarm or fear, either by American businessmen or by overseas businessmen who are selling or are planning to sell in the U. S. market. Forward-looking American businessmen regard it as a challenge to their and the government's ingenuity in running the American economic life.

High taxes and rising costs of materials and labor have caught many companies in an uncomfortable profits squeeze. As long as their volume of sales remains high, they can retain enough profits to carry through their capital spending programs.

But if sales volume declines and costs remain high, many companies will find it impossible to carry out their programs. The U. S. Government can help relieve this profits squeeze by allowing the excess profits tax to die this June. So watch for this indicator.

The government can also demonstrate its ability to meet the challenge offered by the approaching plateau of defense spending by cutting personal taxes when the present law expires at the end of this year. An early announcement of such a tax cut would have the added psychological effect of inducing people to spend more money throughout 1953, even before they received it.

The second half of 1953 could, barring war, usher in for the U. S. the greatest era of peacetime prosperity.



Britain on the Road Back?

Limited convertibility, stepped-up overseas investment, and steadying raw materials prices could tip the precarious scales in Britain's favor this year. But the road is full of obstacles and going will be hard

LONDON—"Down to Solvency" best describes the Tory Government's record in the past year. "Up to Prosperity" is the hopeful marker for the road ahead. The coming year will tell whether this road does lead toward prosperity or merely around a circle into the "Crisis of 1955." It is probably Britain's last chance of regaining the economic power needed to hold its commitments around the world.

Guided by Chancellor "Rab" Butler, the Tories face the new year, supported by a surprisingly bullish feeling in the country. The threat of bankruptcy, only months away last spring, has gone.

The Tory record is full of contradictions. Solvency has been achieved in the familiar pattern—down with imports, down with investments, even down with trade.

An annual balance of payments deficit of £460-million at the end of 1951 was turned into a surprising annual surplus of £50-million by the first 6 months of 1952. In October, for the first time in a year and a half, Britain's gold reserves went up—by $82-million. In November, the gap between Britain's exports and imports was narrowed to only £36-million, the smallest since November, 1950.

Actual figures seem hardly conducive to a "bullish" atmosphere. But that is where the contradictions come in. The statistics do not show the shifting patterns of British trade and production.

Production in the all-important basic industries—coal and steel in particular—has maintained a steady rise. With a bigger labor force in the pits, Britain's coal production looks better than at any time since the war. At the same time the steel shortage has been greatly eased. Minister of Supply Duncan Sandy thinks this year will see British steel top its 1950 record of 16¼-million tons a year. For 1952, the figure was about 16-million tons, 400,000 tons more than in 1951.

Deflation has allowed the government to peel off the first small layer from the mat of controls that weigh heavy on all British industry. Most non-ferrous metals are now free from physical controls. In several minor trades like tea, sweets, and eggs, the end of controls has either come or is imminent. These few steps are small compared to the barriers and obstacles that still stand between Britain and a free economy. But they are interpreted as signs of bigger things to come.

Fall-off of production in the

metals and engineering industries can be explained largely by the extensive cut-backs in British rearmament that are quietly being decided as a result of Churchill's speech in the Commons last July.

Deflation has brought from the government a promise to tackle the biggest problem of all—the income tax. Chancellor Butler has promised that a substantial tax reduction will be a number one target in his budget this coming year.

These small steps on the path to freedom are the real reason for the new confidence in British industry. They offset the gloomy export picture, now at any rate. Whether or not the confidence remains, depends on the way industry tackles its old problems of selling abroad—the problems of too little, too late, and too expensive.

Here, too, the Tory Government is looking hesitantly toward freedom. It is being urged to look that way not only by Americans, but also by Australians and Canadians. In fact, the British Treasury now fully recognizes that the price of holding the sterling area together is going to be the removal of as many exchange controls as possible—in short, the restoration of some sort of convertibility.

This was no easy decision for the Tory ministers. The champions and opponents of convertibility in Britain and the sterling area have recently been forcing their views on officials and the public in no uncertain terms.

Convertibility: Two Sides

Among the opponents of convertibility is a large segment of the Tory party itself and of British business. These "Empire Firsters" are convinced that Britain's salvation lies in highly protected sterling-area markets and sources of supply. They call for greatly increased imperial preferences and even more discrimination against the dollar than now exists.

These right-wing Tories are finding themselves in an unnatural alliance with the Labor Party, which is raising the cry that convertibility means a cut in the British standard of living. Finally, in the sterling area the Asian dominions — particularly India — have made strong representations to the Treasury to go slow on convertibility. These countries feel that they have a favored position as regards the supply of dollars from Britain under the present exchange control systems, and they do not want to lose it.

On the other side of the fence, the Australians, with strong moral support from Canada, are pushing hard for convertibility. The sterling crisis of last winter came as a great shock down under. The government, as well as the opposition, is heavily committed to a large economic development program.

The specter of bankruptcy brought on a bad case of the jitters. Convertibility, the Australians hope, will attract the badly needed American capital without which the government's promises cannot be made good. This same hope inspires supporters of convertibility in other parts of the sterling area and in the U. K. itself.

It is not surprising that in the face of this controversy there will be no "rush for freedom", as one Treasury official puts it. These are the major qualifications the Treasury takes for granted when it uses the word, convertibility:

- It would apply only to current account. Capital convertibility is a decade or more away in the opinion of most.
- It would apply only to nonresidents of the sterling area.
- The "right to discriminate against the dollar" with import quotas and other physical controls would be demanded within broad limits.
- A stabilization fund from some outside source (that is, the U. S., Canada, and/or the International Monetary Fund) would be needed to tide sterling over temporary or seasonal crises.

Nobody nowadays thinks that even convertibility will attract enough private capital to places like Asia and Africa to scratch the surface of the need for economic development in these places. Nor does anybody think Britain will be able to earn a big enough surplus on its balance of payments to finance the needed projects publicly. U. S. loan money—and in all probability grants—will be needed. Accordingly, the British are set to propose a joint Anglo-American development agency to supervise such projects.

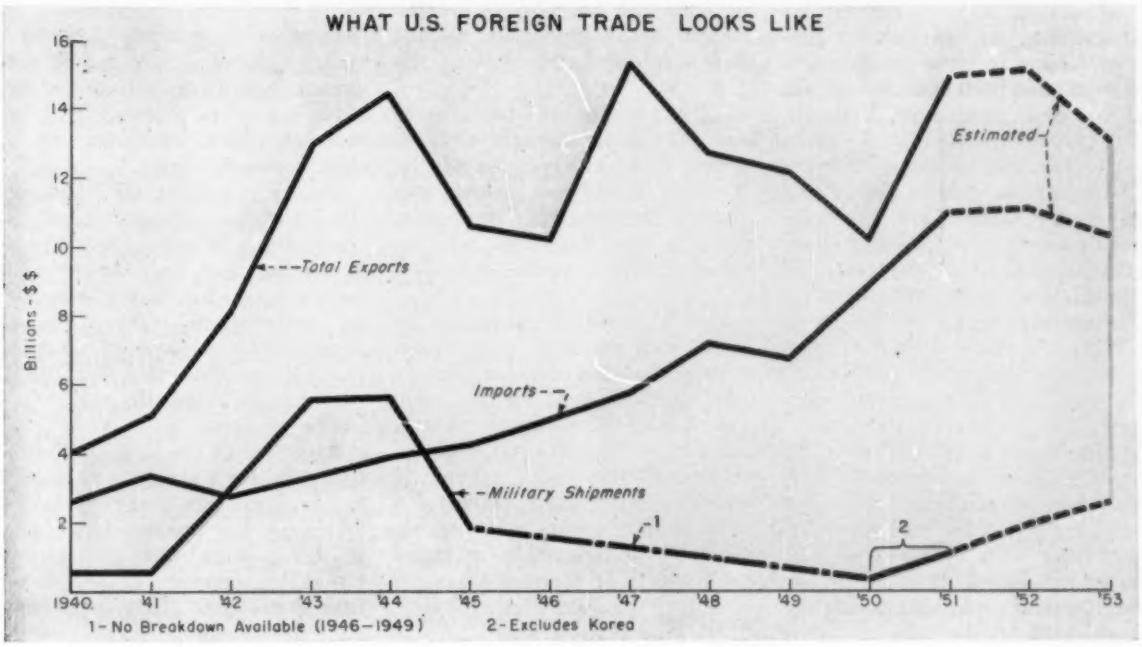
The British will be quick to judge the attitude of the new U. S. Congress toward tariff cuts. Anything unfavorable could have a disproportionate effect on Anglo-American parleys in 1953.

The Treasury would like to explore with U. S. officials the problem of bringing more stability to the prices of sterling-area raw materials. The dollar earnings of more important than the individual earnings of British exports. Price fluctuations in commodities like tin and rubber can more than wipe out the effects of a successful dollar export drive from Britain itself.

Up to Prosperity?

Hope for inter-governmental agreement on raw materials—on long-term contracts or commodity agreements like the International Wheat Agreement—is pretty much on the wane, however. The fact is that when you get down to cases, nobody really wants such agreements. This applies to all the important commodities — wool, tin, rubber, cotton, and wheat. The present British government, unlike its predecessor, is likely to put far less emphasis on this type of solution.

Limited convertibility, increased overseas investment, the hope of more stability in raw-materials prices—these are the external measures the Tories are looking to on their road "up to prosperity". All are heavily underlined with caution. Direct aid in the form of off-shore purchases and residual arms aid will still be coming in over the next year and it will be necessary. But the day of one-shot operations like the British loan and the Marshall Plan has gone. Now all sides agree that permanent planning on the level of Bretton Woods must be tried again.



U. S. Foreign Trade Rides High

FOREIGN TRADE of the U. S., after holding at record-breaking levels for the past 2 years, is slated for a slight dip in 1953. With little relaxation of import controls by other countries anticipated, total American exports will probably recede to about $13-billion.

Imports, on the other hand, will hover close to the record $11-billion of 1951 and 1952 unless the U. S. economy suffers a setback. The world dollar trade gap with the U. S. will be reduced nearly 50% to approximately $2-billion. Should business activity show some sluggishness in the second half of this year (page 11), imported merchandise would fall to around $10-billion.

Increased military shipments for the defense of Western Europe and the Far East will be more than offset by a reduction in commercial exports. Barring such unforeseen circumstances as another steel strike, non-military exports should register somewhat of a comeback from the last half of 1952.

In that period, a sharp decline of 20% from the first 6 months occurred. Despite the expected rise in shipments of military goods, monthly exports undoubtedly will not hit last spring's rate.

In March and April, they exceeded $1.4-billion. An erratic pattern then followed, settling down to around $1-billion a month. The 1953 average ought to run slightly more.

Three major causes for the downward adjustments made by foreign countries in their purchases of U. S. commercial products are:

- Overseas governments have been rebuilding their gold and dollar reserves. The healthy trend began in the second quarter of last year when foreign nations added $382-million to their holdings.
- The broadening of direct controls over international trade and payments has played a large role in the curtailment of American markets. Western Europe, it's now estimated, will run up a dollar surplus amounting to nearly $1-billion in the 1953-1954 fiscal year. We may see some loosening of import restrictions in at least one area by 1954. Furthermore, it may lead to partial convertibility of some European currencies.
- A slackening off in production in both Latin America and Western Europe has contributed heavily to the contracting demand for U. S. goods. By producing less, the peoples of these continents have less local currency available to spend for consumer items. Furthermore, with production of merchandise for export down, dollars available from earnings are shaved.

Reduced output last year was not uniform throughout the South American Republics. But it was especially obvious in such usually reliable markets as Brazil, Bolivia, and Chile.

At one point the industrial index for Brazil dropped 34%. Chief reason for the economic disorder there is the deteriorated exchange condition. Unless arrangements are made soon to pay the $250-mil-

lion backlog on U. S. commercial obligations, you can look for further decline in American exports to Brazil and little hope for revival of maximum production in Brazil.

Both the decline in the world prices for tin and copper and the protracted negotiations with the U. S. for agreements on these metals were responsible for a substantial fall in the Bolivian and Chilean industrial indices. With the nationalization of the three leading tin mines in Bolivia, output undoubtedly will continue to slide in 1953. Chile, on the other hand, may top previous records.

After 4 years of impressive industrial gains in which Western European production jumped over 60%, a gradual decline set in during 1952. The decline was partially due to the wave of inventory liquidation accompanying the world-wide textile slump.

It also reflected the transition period for the long-awaited shift in production from light consumer goods to machinery and other heavy items marketable in Europe's spreading overseas outlets.

An incentive important to U. S. sales in many Western European countries is the retention quota system on imports. Under this arrangement, various nations permit exporters to retain as much as 90% of their dollar receipts for purchase of U. S. merchandise.

Trade Reprisals Loom

Lessened inflationary pressures in many foreign countries indicate that American exports may be less attractive in price this year. Hints of trade warfare, in retaliation for certain U. S. imports hampered by high tariffs, will also make a dent in total shipments, especially for farm products. Six nations attending the General Agreement on Tariffs and Trade in Geneva strongly warned the U. S. it can expect trade reprisals.

On a commodity-group basis, here is the outlook for some of the U. S. principal exports. The sharpest drop this year will be in agricultural goods. Farm shipments will fall about 20%. This decline is linked for the most part to the improved conditions in the importing countries and also to greater exports from exporting nations that normally compete with the U. S.

Latin America will continue to take increasing amounts of U. S. crops. However, because of the widening dollar gap, which was roughly $800-million last year, some of the Republics will be forced to turn to barter deals elsewhere.

The increase in purchase of U. S. farm products is in direct contrast to the decided dip in other items bought by the Latin Americans. Consuming nearly one-fourth of U. S. total overseas shipments, they rank second to the Europeans as a market. A steep decline in sales to the Republics would precipitate a major crisis for U. S. businessmen.

S. A. Cut Would Hurt

For example, 50% of U. S. exports of automobiles, 40% of chemical products and electrical machinery, and 35% of industrial and agricultural machinery are sold to Central and South America. U. S. exporters of industrial goods to Latin America are in for a period of shrinking sales.

Little change from the last half of 1952 is expected in the export pattern of most key commodities. Shipments of coal, petroleum, light machinery, and automobiles will contract further. Textile exports have probably already hit the bottom. But sales of heavy capital goods are likely to climb.

With the outlook for steel supplies much brighter, export controls on steel may be lifted this year. A marked increase in U. S. output of heavy equipment will help the tight supply of such products as tractors, shovels, and cranes. Machine-tool makers will continue to watch their markets deteriorate because of competition from low-cost, efficient European tools. Electrical appliance and automobile manufacturers also will encounter growing opposition. Increased production of foreign coal and petroleum will restrict shipments from the U. S.

The narrowing of the U. S. favorable trade balance in 1953 will result chiefly from maintenance of imports at high levels. Although the commodity pattern should not deviate to any degree from that of 1952, importers probably will be more cautious, operating on a month-to-month basis.

This year will be the "Year of Decision" for the future of U. S. trade. One of the most formidable of all the new President's problems will be what course to follow on international-trade policies. Eisenhower's slogan of "Trade, Not Aid" indicates that he will not return to isolationistic protectionism in any form.

Even though the U. S. trade policy is due for a complete re-examination, it appears that Eisenhower will have the Congressional vote to obtain liberal laws on international commerce. There seems little question that economic or "defense-supporting" assistance will be cut. But this would have been so, regardless of which party had won the election.

First crucial test will be met when the Reciprocal Trade Agreements Act comes up for renewal this year. In order that U. S. imports be maintained at the $11-billion figure, at least the basic tenets must be kept. For this is the barometer to U. S. purchases abroad.

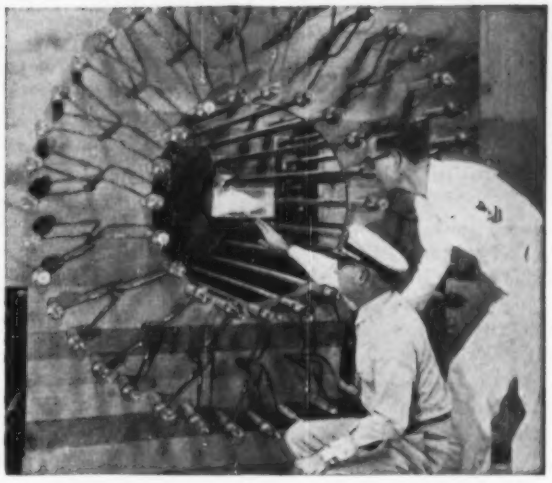
Emphasis On Self-Aid

Point Four and other forms of financial assistance will be viewed more realistically. Emphasis will be placed on more self-aid. Eisenhower's policy will call for a long-term plan to develop new markets abroad in order to maintain increased production at home after the defense build-up. It also must encompass a large-scale program to assure the U. S. of new sources of raw materials.

In view of Stalin's new line of attack against the West—one which is aimed at upsetting world trade—U. S. trade supremacy will be challenged in 1953. Russian trade concessions and barter deals to lure world markets will have to be met. It is doubtful whether any of these tactics can influence the continued good prospects for U. S. trade this year.

This Month's How To . . .

. . . study gamma-radiation effects

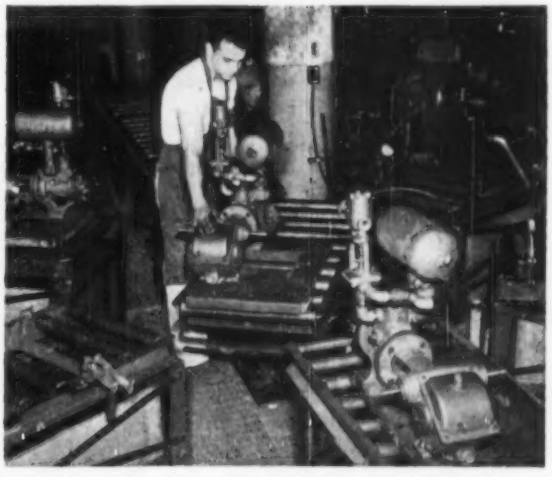


Gamma-ray generator is U. S. Navy's newest tool for studying the effects of radiation on a variety of materials. The generator uses cobalt-60 as the source of gamma radiation. The device could be used for 5 years with only a 50% loss of radioactivity.

One hundred capsules, each containing 12 curies of radio-cobalt, are utilized in the 60 tubes of the generator's pneumatic transfer system. The pneumatic tubes permit handling small amounts of the isotope from a point shielded from the main source of exposure by a barrier 5 ft. thick.

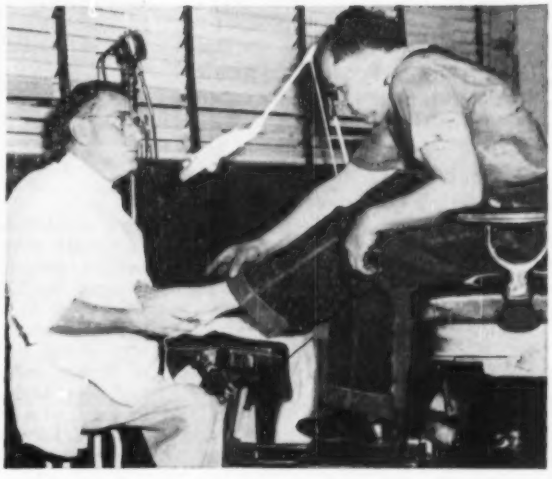
Atomic Medical Division of the Naval Medical Research Institute initiated preliminary studies on the generator in 1949. Development of the generator is expected to provide reliable data on physiological effects of exposure.—Chem Wk, Oct 18, p36

. . . make pump testing more flexible



A turntable switching arrangement is a feature of the F. E. Myers & Bro. Co.'s assembly line. Adapted from the railroads, it lets Myers test a pump for any length of time without jamming the assembly line. On each main assembly conveyor, there is a four-place testing setup made of roller conveyor sections. To test a pump, the operator runs it onto a turntable section of the main conveyor. Then he pivots the section and rolls the pump to any one of the test stations. The necessary connections are made and the test is ready to begin. Each test station is equipped with clamps, motor, belt, and water tank.—Factory, Nov, p93

. . . improve employee relations



Worker's feet are as important as their hands. Feet usually cause more aches and are responsible for more slow-downs than hands—always considered a worker's most important appendage. To prove this point, Fulton Bag & Cotton Mills in Atlanta, Georgia, decided to open a foot clinic to treat employee's corns, calluses, bunions and other foot ills. Today, the foot clinic is as important to Fulton's 2,000 employees as any other part of its health program. The clinic cost $3,000 to open, has been in full operation four hours a day, Mon. through Fri., since 1947.

Fulton's experiment has proved more than worthwhile. Better foot health, and less fatigue have reduced absenteeism by a whopping 12% and, at the same time, have improved employee relations.—Business Wk, Nov 8, p152

Lithium: Growth Ahead

- A war industry finds itself with a bright future
- Product applications open up in many new fields
- Problem: make the most of poor-grade ore sources

INDUSTRY is finding a tremendous future in lithium. Right after World War II, lithium looked like a casualty of reconversion.

Producers, geared for peak production, found themselves with a peace-time market that was only a small fraction of their capacity. Today it has a firm market under it and is heading into its second big growth period. The reason is that researchers are discovering it has properties that can do a variety of jobs such as these:

- One compound when mixed with water gives off a large volume of hydrogen.
- Another derivative, gaining popularity in the air-conditioning field, takes moisture out of the air.
- Metallic lithium helps make better, stronger castings for nonferrous founders.
- Lithium has been a key raw material for the hydrogen bomb.

Individual producers have been quick to grasp lithium's potential. They have started expanding their production. Here is what they are planning:

Foote Mineral Co. has a project that it hopes will double U. S. capacity by the middle of 1953.

Lithium Corp. of America, Inc., is planning a 50% boost in its ore refining unit and consolidation of its plants for better operation.

American Potash & Chemical Corp. and Maywood Chemical Works are improving their sources of lithium-bearing ore.

Right now, the industry is holding back on product research and engineering to develop its resources and study its process research. Companies are straining their budgets to build up research that they hope will give them a competitive edge when they are through the expansion period.

Today, there are five big applications: lubricating grease, aluminum welding and brazing, air conditioning, ceramics, and alkaline storage batteries. These principal markets will line up like this:

- **Lubricating grease**—Lithium-containing grease showed a 2-million lb. consumption in 1951. Last year consumption went up about 50%. Its properties may eventually cut down today's 250 greases.
- **Aluminum welding** — Lithium consumption will grow with the fast expansion of the aluminum industry. In welding or brazing aluminum, lithium compounds dissolve the oxide coating that protects aluminum.
- **Air Conditioning**—Lithium is expected to answer the need for atmosphere control in home air conditioners. The industry expects a doubled lithium demand in the next 3 years.
- **Ceramics**—Several lithium products speed up production operations. They reduce firing temperatures required for enamel finishes. But ceramics firms will not be able to take full advantage of lithium until the over-all capacity of producers rises.
- **Alkaline batteries**—This battery has several industrial applications, particularly in the railroad industry. This market is expected to double in 3 years, then perhaps level off. A possible new market is the automobile industry.

Industry experts, at this point, think the goal of 10-million lb. of lithium carbonate from which end-products are made will fall short of the demands in most of these markets. Even by 1960, the expected jump in output might still not bridge the supply-demand gap. —Business Wk, Nov 15, p64

Creel for Large-Package Yarns

New vertical magazine creel, designed to handle cakes, cheeses, and other heavier yarn packages, has been announced by Edward S. McBride Co. The creel is equipped with sealed mercury-switch stop motions and two-way signal lights for quick location of broken ends. A McBride "Universal" cone holder permits use of cones or tubes in a wide variety of package sizes. Creel accommodates nearly any package and is suited for warping of heavy yarns. Special shields on which the individual package rests prevent slack ends from dropping down out of position and thus becoming lost or tangled. The new creel takes about half the floor space, per end of yarn, of previously designed vertical creels. All two-cone arrangements are loaded from one side of the creel. All ends are easily reached from aisles within the creel.—Textile World, Nov, p180

the NEW

Portable REFRIGERATOR

at your fingertips . . .

In the Home for quick refreshments, parties. Saves steps.

NOW – an electric refrigerator that keeps foods fresh and quickly provides delicious chilled drinks. Easily *portable* and styled as fine furniture to make a handsome hospitality center in any room, or outdoors. One of many recent Servel developments in household and commercial refrigeration and air conditioning, the Servelette holds plenty of snacks, bottles and cans; makes 28 large ice cubes. Operates *silently* on A.C. or D.C.– available for all standard voltages from 32 to 230. Overload protection.

In the Office for smart, convenient entertaining.

For Doctors' Offices to protect perishable drugs, vaccines.

WRITE FOR DETAILS

Servel
REFRIGERATORS

SERVEL, INC., INTERNATIONAL DIVISION, DEPT. MD-1 • 20 PINE STREET, NEW YORK 5, N. Y.

Servel gas, kerosene, electric refrigerators

Florence gas, kerosene, electric ranges

Servel room air conditioners

Servel industrial air conditioning.

Air Ducts Ease Assembly-Line Changes

Quick-change air-exhaust system helps juggle assembly lines in Zenith Radio Corp.'s plant. Running the length of each soldering bench is an air-exhaust duct. Flexible metal hose, like the one in front of the operator in the foreground, can be "plugged in" at any point along the bench. There are openings every few feet along both sides of the duct. Hoses are connected only at stations where soldering is actually being done.—Factory, Nov, p111

Activated Sludge Plant May Become Family Size

Septic tanks and absorption fields are not the answers for home sewage disposal. They will not work in all soils.

Tests made by the Purdue Research Foundation indicate that a family-size activated sludge plant is a possible answer.

There were three parts to the tests. For the first 399 days, a grinding toilet was used; for 100 days, a standard flush toilet; for a total of 137 days, the grinding unit went back into use with its effluent recirculated continually as flush water.

The plant ran for 399 days without any odors or any removal of solids except for those carried in the effluent. It was decided that a 227-gallon tank is sufficient for a family of three, but the minimum practical size was not determined.

When the plant switched to a regular flush toilet for 100 days, a 4-in. line to the aeration tank had to be substituted for the 1-in. pipe that had been sufficient in size to carry ground wastes. Grinding is necessary; aeration alone will not disintegrate the solids.

Part three of the test indicated that recirculation of the water does no harm to the process and causes no nuisance. Importance of this recirculation, as a conservation measure in water use, is obvious.—Eng News-Rec, Oct 30, p39

Melody in Plastic

Pan-American Band Instruments and Parkwood Laminates, Inc., have come up with something new in woodwinds. Pan-American is now offering two new instruments—a clarinet and an oboe—made from phenolic impregnated stabilized wood. Tone quality is said to be excellent, and durability is superior to most traditional wooden instruments.

The material consists of specially selected birch veneers impregnated with Bakelite phenolic resin and compressed into solid sheets under high pressure. Results are so good Pan-American guarantees instruments against cracking, checking, or splitting under normal usage.—Mod Plastics, Nov, p206

Ultrasonic Therapy Unit Simple and Inexpensive

A production-type unit for ultrasonic therapy is now being manufactured by the Birtcher Corp. The unit consists of an electronic oscillator and crystal transducer. The transducer is installed in a chromium-plated brass gun applied manually to the skin.

Compared with ultrasonic generators produced for therapeutical use in Europe, this unit is remarkably simple and inexpensive. It can be plugged into any alternating power circuit. Ultrasonic output can be regulated accurately for values of 0.14 to 3½ watt per sq. c. at a constant frequency of one megacycle.

Basic power circuit includes a high-voltage transformer, filament transformer, a pair of half-wave rectifier tubes, and an oscillator whose output is conveyed to a quartz crystal in the gun by a coaxial cable. A mechanical timer regulates output within periods ranging from 1 to 30 min.—Electronics, Nov, p202

Shipping Orange Juice

Single-strength orange juice is now shipped from I.D.T. Cancer Research Foundation's plant in Florida to Boston (1,450 miles) without refrigeration and with neither loss in flavor nor deterioration in quality.

Juice is extracted in Food Machinery & Chemical Corp. units that hold oil content quite low. A paddle finisher removes coarse pulp and seeds. Then the juice flowing over a stainless-steel pan is exposed to ultraviolet radiation.

Following irradiation, the juice is cooled quickly to 33° F. and pumped into jacketed tanks where nitrogen removes excess oxygen. It then flows into 2,500-gal. tank trucks, which are then sealed. The trucks, similar to milk trucks, are insulated against heat gain with 2½ in. of cork.

The trip takes about 39 to 40 hr. Temperature loss during that time is 2° F. per day. So the juice arrives at about 36° F. On arrival, the juice is kept refrigerated and under a blanket of nitrogen until it is bottled.—Food Eng, Nov, p93

Garbage to Compost—7 Days

Composting process solves garbage-disposal problem and also makes a profitable product that can go a long way in helping to rejuvenate some of the world's poorer soils. Spain will get identical plant

IT SMELLS like good, fresh earth. It sells for $68 a ton. And it solves a garbage problem. Ten tons of compost are being produced each day from organic refuse in a seven-day aerobic fermentation process at Bay Shore, N. Y. Compost manufacturing at its incinerator-and-open-dump site is thus solving a refuse disposal problem.

Six men and a plant manager operate the $100,000 composter at its present capacity. The men work from 8 A.M. to 5 P.M. but the bacteria, doing the decomposition, work around the clock and complete their work in a 7-day cycle.

The entirely inoffensive, highly mechanized process was developed by Eric Eweson, Swedish-American soil bacteriologist. Backing has come from Frazer Products, Inc., making it the Frazer-Eweson composting process.

The plant in Bayshore is the first full-scale installation of the F-E process. Two smaller installations have been operated. Five tons of compost from one of them were used to seed the Bayshore operation.

The plant, except for original seeding, takes no inoculating other than an automatic recirculation of process tailings—the 10% or so of finished product too coarse to pass a 6-in. screen.

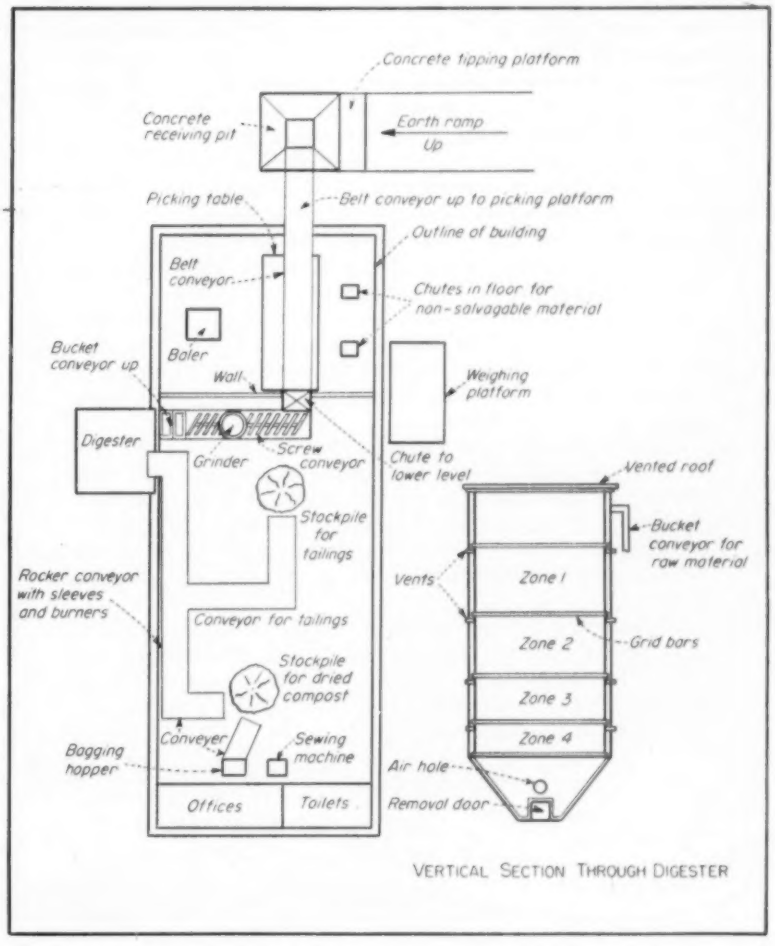
Key to the composting plant is its digester. It is here that the aerobic bacteria do their work.

Garbage — fresh, sorted, and ground—is conveyed to the top and dropped into the 5,000-cu. ft. digester. Some manure goes in with it. Seven days later it is shoveled out at the bottom, a stabilized if slightly sweet-smelling product. Sifting and drying finish the product to a homogenous humus.

The digester is divided vertically by three steel grates—making four zones of digestion. In each zone the composting mass bridges the grate openings and remains for a specified period while controlled air is passed up through it. At the end of the period, a steel bar pulled back and forth over the top of the grate breaks the material's bridge effect and drops it to the next zone.

In zone 1 (at the top) the mass is held for 24 hr. In zone 2 it remains 24 to 48 hr. and heats up to 170-175° F. as the bacteriological process continues. Zone 3 temperatures drop to 130° F., and fresh air at zone 4 puts a stop to the bacterial action.

From the digester, the composted material is graded and dried. The 10% of product too coarse to pass all screens is discarded as tailings to be used as bacterial culture to seed new batches. The rest is a 30% moisture product ready to stockpile.—Eng News-Rec, Nov 6, p40



MECHANIZED PROCESS is aerobic, inoffensive. Assorted conveyors lessen cost of semi-continuous flow. Digester is heart of the plant.

Saucerships For Space

There is a logical and acceptable reason for flying saucers, shapewise at least, says Dr. W. F. Hilton, well-known British aerodynamicist. The saucer, he claims, is an excellent shape aerodynamically, for solving the problem of braking within the atmosphere of a planet.

What you need for best deceleration, assuming that braking rockets are not used, is a vehicle with maximum drag per unit area, he says. Spheres, which show such drag, are poor because you also need lift. Thus a disk, rotated for stability and thick at the center to take payload, seems to be promising for certain classes of space ship.—Aviation Wk, Nov 3, p34

Letter from the Editor

Dear Reader:

Last month I wrote you that the McGraw-Hill Digest this month would come to you in a new size and in a new dress, that the Digest was being made larger so we could bring you a better magazine at no extra cost to you.

When we decided to make this change, we did so in full recognition that many of you liked the small size because it was handy to read and carry. But in your hands now is a magazine that we believe will be easier for you to read and more valuable to you because of the longer length of articles, more management-type stories, larger illustrations, and the expanded coverage in technical developments.

As you go through this issue, you will see the same type of articles and the same departments—"Business Trends," "New Products," and others—that brought you so much needed information in the past. But you will see them with new type faces, with new presentations that will bring you the information faster and easier.

All these changes, we think, have added up to a magazine that will better meet its editorial purpose—to bring to you, the world's business leaders, both the business and technical information that will help you run your businesses more efficiently, more profitably.

And let me repeat one thing I said last month—that the services the Digest brings you remain unchanged. We want you to continue to ask us for the complete original articles of abstracted stories, more information on new products and technical developments, and new catalogs as listed in the "Production Ideas from Manufacturers' Catalogs" department.

I believe that this new magazine is a better magazine. Will you write and tell me what you think of it, whether you find it more interesting and valuable to you, and what we can do to make it a better magazine for you? Why not write as soon as you finish reading this issue?

Sincerely yours,

Harry S. Whalen

Editor

Chemicals for Rio

Brazil is breaking out in a rash of new-plant developments involving American firms

TOUGH RESTRICTIONS on all imports into Brazil have made American drug companies and other sections of the chemical process industries realize that if they want to do business with Brazil's 53-million people, they had better think of building plants there.

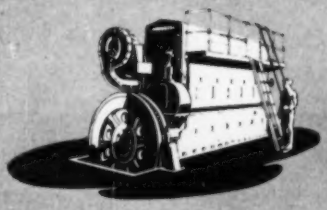
The reason? Brazil's unpaid bills to American, British, and German exporters are up around the $500-million mark, more than the combined gold and foreign-exchange reserves in the Bank of Brazil.

So American companies are losing no time in moving behind the trade barriers. Here are late developments:

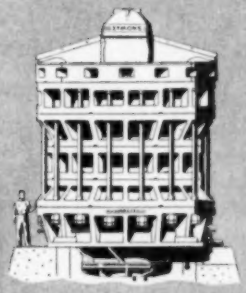
- **E. R. Squibb & Sons Do Brazil** will move into its new plant in Sao Paulo this month. Drugs made in the U. S. will be finished and packed there. Sometime this year, Squibb will manufacture antibiotics in a unit now being built.
- **Pfizer Inter-American S. A.** is converting Squibb's former plant in Sao Paulo for occupancy this year. It will then slow down imports of finished antibiotics and repackage bulk imports.
- **Parke Davis Inter-American Corp.** is importing no finished products; 60% of sales are of materials made entirely in Brazil.
- **Sydney Ross Co.,** subsidiary of Sterling Drug Co., is building a $3-million plant near Rio de Janeiro. Sydney Ross imports only 7 to 8% of its finished-product sales, packages 2 to 3% from bulk imports, makes the rest in Brazil.
- **Schering S. A.** is finishing all its products in Brazil, although over 97% of the raw materials comes from abroad. Schering is enlarging its plant.
- **Fontoura-Wyeth** is adding a penicillin plant at Sao Paulo, location of its present operation.
- **Meyer Chemical Co.** of Detroit has formed a Brazilian company to build a $250,000 plant.—Chem Wk, Nov 1, p50

NORDBERG

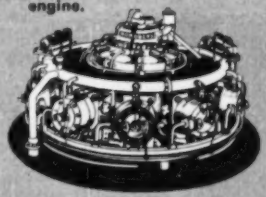
MACHINERY SERVES THE WORLD



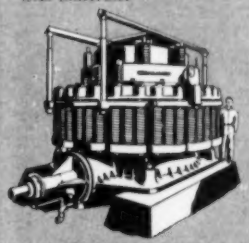
DIESEL ENGINES . . . 2 and 4-cycle types, for fuel oil, Duafuel and natural gas operation — from 10 to over 10,000 H.P. in a single engine.



"SYMONS" PRIMARY CRUSHERS for heavy duty crushing of ores and industrial minerals.

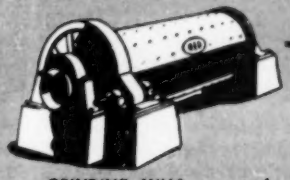


RADIAL ENGINES . . . for natural gas — fuel oil and Duafuel operation. Compact, simple to install — 1950 to 2125 H.P. or 1250 to 1500 K.W.



"SYMONS" CONE CRUSHERS for all fine reduction crushing requirements.

"SYMONS" VIBRATING SCREENS . . . for all wet or dry screening operations.



GRINDING MILLS . . . and other Machinery for basic processing of ores and minerals.

. . . FOR POWER AND LIGHT

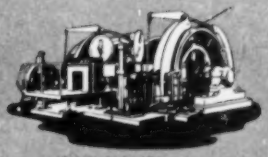
. . . FOR SAILING THE SEAS

. . . FOR IMPROVING RAILWAY TRANSPORTATION

AND FOR PROCESSING THE EARTH'S ORES AND MINERALS

"SYMONS" VIBRATING GRIZZLIES . . . for primary heavy duty scalping operations.

RAILWAY MAINTENANCE MACHINERY . . . a full line of efficient, money-saving machinery for top quality track maintenance.



MINE HOISTS . . . in types for hauling both ore and men, in large coal and metal mining operations.

"PACKAGED" POWER UNITS . . . from 10 to 45 H.P.—6 to 30 K.W. — for generating electricity, for pumping and for straight power applications.

GASOLINE MARINE ENGINES . . . from 95 to 145 H.P. for fish boats, tugs, and pleasure craft.

NORDBERG MFG. CO., Milwaukee, Wisconsin, U.S.A. CABLE: NORDBERG

NORDBERG THE WORLD OVER

LONDON
19 Curzon St., W. I.

PARIS
8, rue du Boccador

JOHANNESBURG
P.O. Box 4139

MEXICO, D.F.
Dolores 3

Dealers in Principal Trading Areas Throughout the World

XAP 153

Industry Meets a Big Technological Challenge as . . .

Atoms and Electrons Go to Work

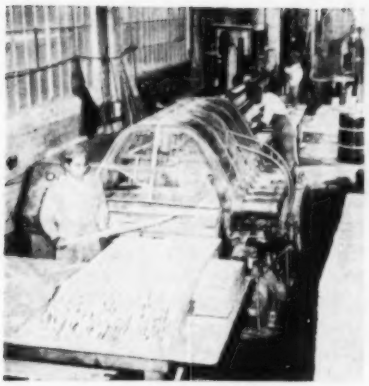
- Radioactive tracers spot invisible interfaces in oil pipelines
- Radio-frequency waves are replacing cumbersome gluing methods
- Electric heating is revolutionizing casting—Elec West, Oct, p 88

GEIGER COUNTER detects interfaces (boundaries) of various fluids flowing in same Standard Oil Co. pipe line. Secret: radioactive tracers.

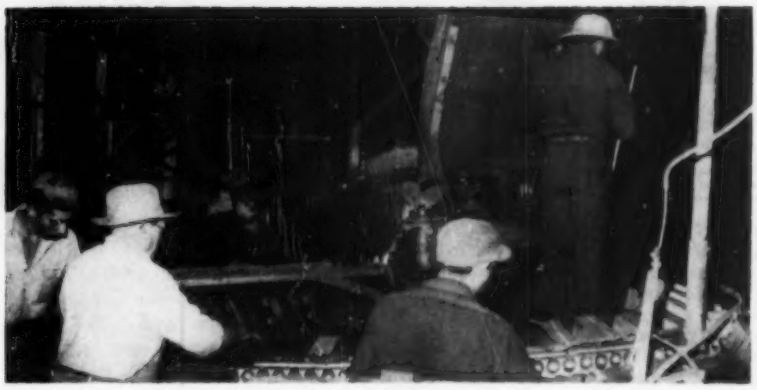
RADIATION-PROOF container of tracer compound is hoisted onto pedestal of injector. Products get shot of tracer fluid on way to storage.

TECHNICIAN times injection. Geiger-Mueller counters at way stations track products en route. Progress is recorded at storage terminal.

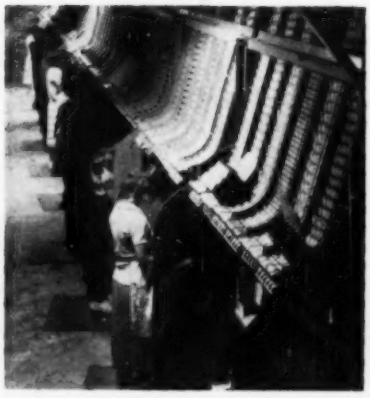
RADIO-FREQUENCY GUN weighing 2¼ lb. tacks glued pieces of laminates on plywood in seconds. Old pressure method, using clamp and presses, took 6 to 8 hr. High-frequency generator (box behind operator) is of the vacuum-tube, self-exciting type, operating on a set frequency of 27.12 megacycles. Generator power, transmitted to gun through coaxial cable, may be tuned to job. Gun handles plastics, thin wood veneer, or a 2-in. plank.



HIGH-FREQUENCY GLUING machine salvages scrap oak flooring boards, turns them into attractive 12-in. flooring squares in 15 sec.

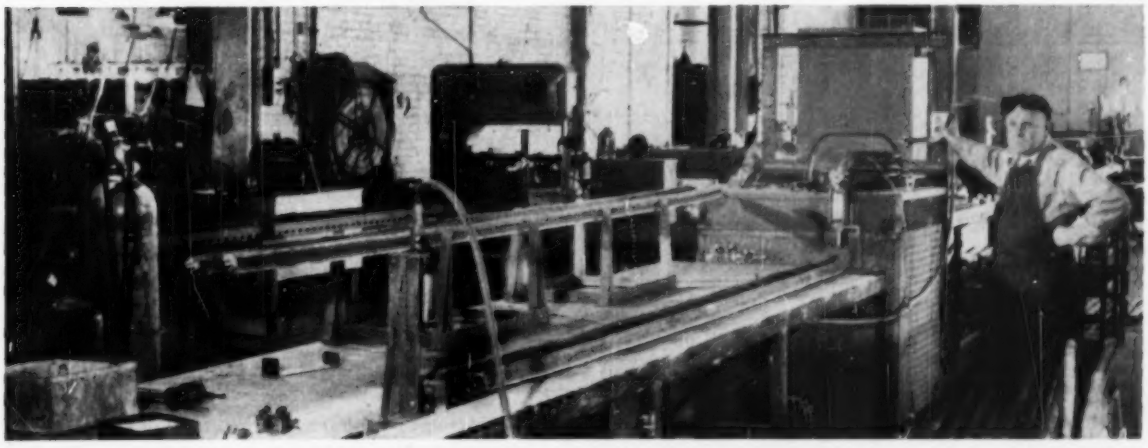


ELECTRIC FURNACE pours steel into rotating mold, casting grinding balls automatically and continuously. This Payne caster consists of machine that rotates ball molds in chain arrangement up a 5° incline. Steel, running down incline, fills molds as they pass.



THIRTY THOUSAND eggs a day are weighed electronically at the Brentwood Egg Co. in California on a Sneed FMC egg sizer, sensitive to 1/24 oz.

INFRARED LAMPS in 7 x 7-ft. chamber dry automobile after power washing in 45 seconds. Chain conveyor draws car through archway. Seventy-two 500-watt lamps, mounted in first half of chamber, start the drying. Seventy-two 350-watt lamps in the second half finish it. Output: 300 cars a day.



RESISTANCE HEATING solved a difficult problem for the Super Cold Corp. Spined copper tubing, used in blower-type refrigeration coils, proved difficult and time-consuming to anneal. Two man-hours were needed to do a single tube. Super Cold heard of direct resistance heating and tried it with excellent results. Two lengths of tubing, laid side by side, are impressed with 25 volts. Annealing take place in less than a minute, with no oxidation, no cleaning.

How to

attract *more* customers

boost employee efficiency

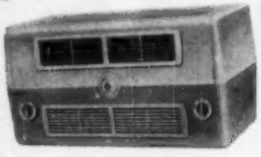
Whether the people concerned are buying from you or working for you . . . you'll get more out of them, if your premises are pleasant, comfortable, attractive.

Keep your plant, office or store cool in the hot weather . . . clean, fresh, well-aired at all times.

Get the right tools from Sylvania to do the job easily, efficiently, economically: Air conditioners to keep temperature down, atmosphere refreshing. Floor polishers to maintain spotless cleanliness. Electrical blowers to assure better ventilation, air free from odors, fumes, unpleasant heat. See your Sylvania supplier for full information!

1. Install SYLVANIA AIR CONDITIONER to keep store, office cool, comfortable

Compact unit fits in window. Cleans, cools, dehumidifies, circulates air. Carries off hot, stale air, odors. Reduces outside noise and dust. Easy to install. Economical to operate. Models to fit your needs.

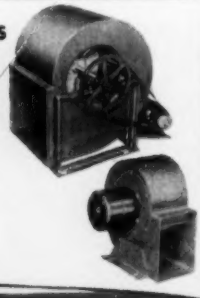


2. Use REGINA FLOOR POLISHER to clean and brighten floors

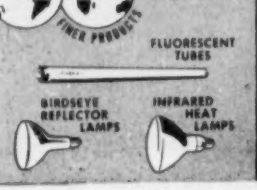
Heavy duty, twin brush machine scrubs, polishes, waxes, buffs—automatically. Works equally well on wood, linoleum, tile, other surfaces. Complete with brushes, polishing pads, buffers. Easy to operate.

3. Install HY-DUTY BLOWERS to improve ventilation

These high powered, all steel units are filling hundreds of uses in factories, stores, lunch rooms, kitchens, washrooms. Produce large volumes of air at low velocity. Spot cool. Carry off dust, fumes, odors. Operate quietly. Many models to choose from.



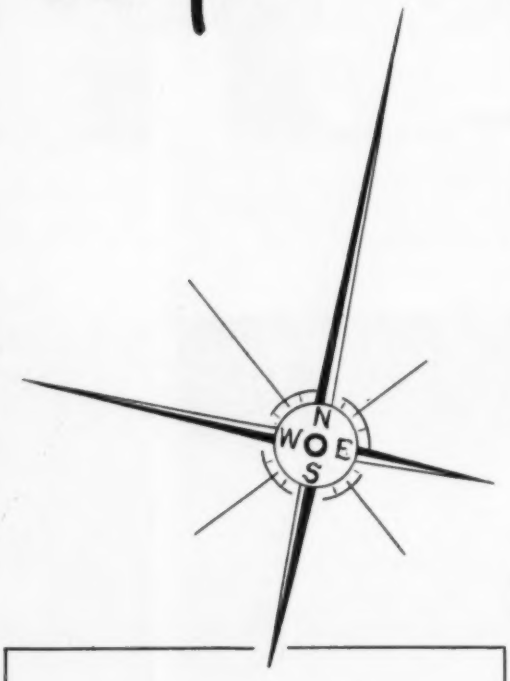
FIRST WITH SYLVANIA FINER PRODUCTS



SYLVANIA ELECTRIC

SYLVANIA INTERNATIONAL CORPORATION, 14, BAHNHOFSTRASSE, COIRE, SWITZERLAND
SYLVANIA INTERAMERICAN CORP., APARTADO 459, CIUDAD DE PANAMA, R.P.
SYLVANIA ELECTRIC PRODUCTS INC., INTERNATIONAL DIVISION, 1740 BROADWAY, NEW YORK 19, N. Y.

ASSIGNMENT: Anywhere



●Need a market survey in the U.S.? India? Brazil? Japan? Or any other part of the world? The Overseas Business Services division of McGraw-Hill International maintains a staff of foreign and business trade experts in 70 countries — a staff that is available to companies in any part of the world for market research and business studies. For free booklet describing services write:

OVERSEAS BUSINESS SERVICES

a unit of the

McGRAW-HILL INTERNATIONAL CORPORATION

330 West 42nd Street — New York 36, N.Y.

Styrene Gets Muscles

Copolymerization and alloying of styrene are yielding stronger and better materials for new applications from flashlights to refrigerator interiors

STYRENE with new strength is breaking into big new markets. With development of alloys that keep the best qualities of polystyrene and improve some of its undesirable characteristics, this plastic material bids fair to extend itself into markets where, up to now, temperatures, weather conditions, and shock have limited its use.

Strengthening styrene can be achieved in three ways: (1) varying polymerization method; (2) copolymerizing styrene with other chemicals to obtain copolymers and terpolymers; (3) alloying polystyrene with other polymers or copolymers to produce materials in which there is no tangible chemical reaction between the components, but in which there is a mutual physical reinforcement.

There are many examples of the improvement of polystyrene, particularly in heat resistance. Polymerization methods permit accurate control of molecule chain length and the complete removal of unreactive monomer. Monsanto Chemicals Co.'s LX is specially polymerized. Koppers Co.'s type X8 is another. Dow Chemical Co.'s Styron 700 is generally regarded as still another example, although its nature has not as yet been disclosed.

Copolymerization of styrene monomer with other unsaturated monomers to obtain other linear polymers, or with doubly unsaturated monomers to obtain cross-linked structure, offers another method to make styrenes adaptable to special use.

Plexene M, introduced by Rohm & Haas Co. in 1946 and no longer available, was an early venture into copolymerization of styrene. Bakelite Co.'s BMC-11, U. S. Rubber Co.'s Kralastic H, (manufactured by Naugatuck Chemical Co.), the S polymers of Standard Oil Co. of New Jersey (styrene-isobutylene), and Dow Chemical Co.'s new 767.2, are all copolymers.

Unfortunately, many of the markets for polymerized styrene cannot stand the cost of these copolymers and terpolymers. So styrene alloys have been developed to meet this particular plastics demand.

Styrene monomer may be copolymerized with butadiene to form GR-S rubber, or high styrene-butadiene material. Acylonitrile may be copolymerized with butadiene to form buna-N or nitrile rubber. Styrene monomer may be copolymerized with acrylonitrile. Then, styrene polymer may be alloyed with any of these three copolymers, and the styrene-acrylonitrile copolymer may be alloyed with either of the two "rubber" copolymers to obtain specialized alloys.

The pioneer of the alloys was Dow's Styron 475, used for large area molding—sections of refrigerators, radio and television applications. Monsanto's LHN, Koppers' MC301, Bakelite's BMSQ151, and Catalin Corp.'s High Impact are at the same use and cost level.

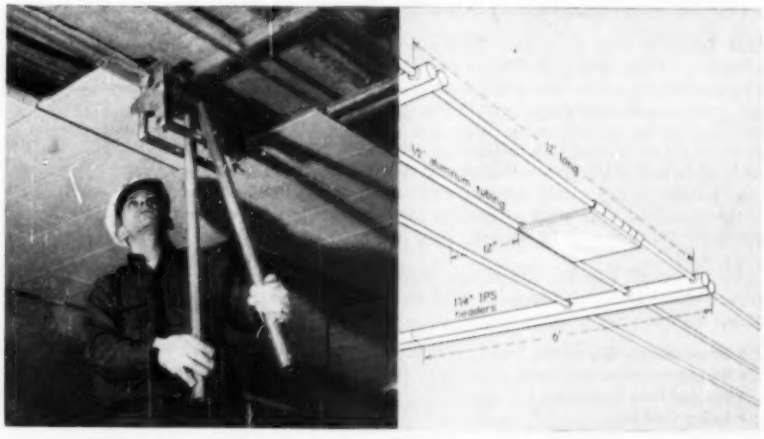
At lower cost and function are Dow's Styron 777, Koppers' MC401, Monsanto's LHA, and Catalin's Medium Impact.

Something brand new, Koppers' MC-409, has endured 198° F. temperatures and survived.

The alloys of styrene offer greater strength because of elongation imparted by the "rubber" content. The alloys containing acrylonitrile offer chemical resistance and weather resistance superior to those alloys that do not contain it. Weather resistance of many alloys may be further improved by the use of fillers such as titanium dioxide.

What is the market potential for alloys? The answer is simple. Think of every place where ease of molding, good electrical properties, dimensional stability, and economy of polystyrene would be an advantage, but where it has usually crazed or lacked toughness in thin sections—and you have a market for the alloys.

They are in use, or are now being considered for use, in many diverse products, such as battery cases, automobile instrument panels, fender wells, luggage, brush handles, piping, tote boxes, bobbins and spools, telephone parts, and toilet seats. Refinements of the alloys are coming out of the laboratories every day. And these new alloys will open up still other markets.—Mod Plastics, Nov, p91



Aluminum Panels for Heating And Cooling

Perforated aluminum panels clipped to prefabricated 6x12-ft. grid of ¼-in. aluminum tubing extend radiant area in Aluminum Co. of America's Pittsburgh headquarters. Surface temperatures will run within 3 to 5° F. of water temperature inside the tubes of grids. Ultralite glass-fiber insulation laid over grids absorbs sound. Required conditioning air is reduced by as much as 50%, saving ductwork. —Power, Nov, p71

MSA
SAFETY EQUIPMENT HEADQUARTERS

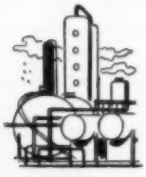
for your every need in

SAFETY EQUIPMENT

For Greater Safety in Every Industry—

OIL

MINING



CHEMICAL

CONSTRUCTION

OVER 2600 ITEMS OF PROVED SAFETY EQUIPMENT

Your Safety is Our Business. Whatever your industry, our aim is to provide you with proper safeguards against the diversified hazards which face your plant and personnel. This job of matching safety equipment to safety problems is carried on by hundreds of skilled technicians, working in our research laboratory and factory—the largest in the world devoted exclusively to safety. The result—a complete line of approved safety items to answer your every safety need.

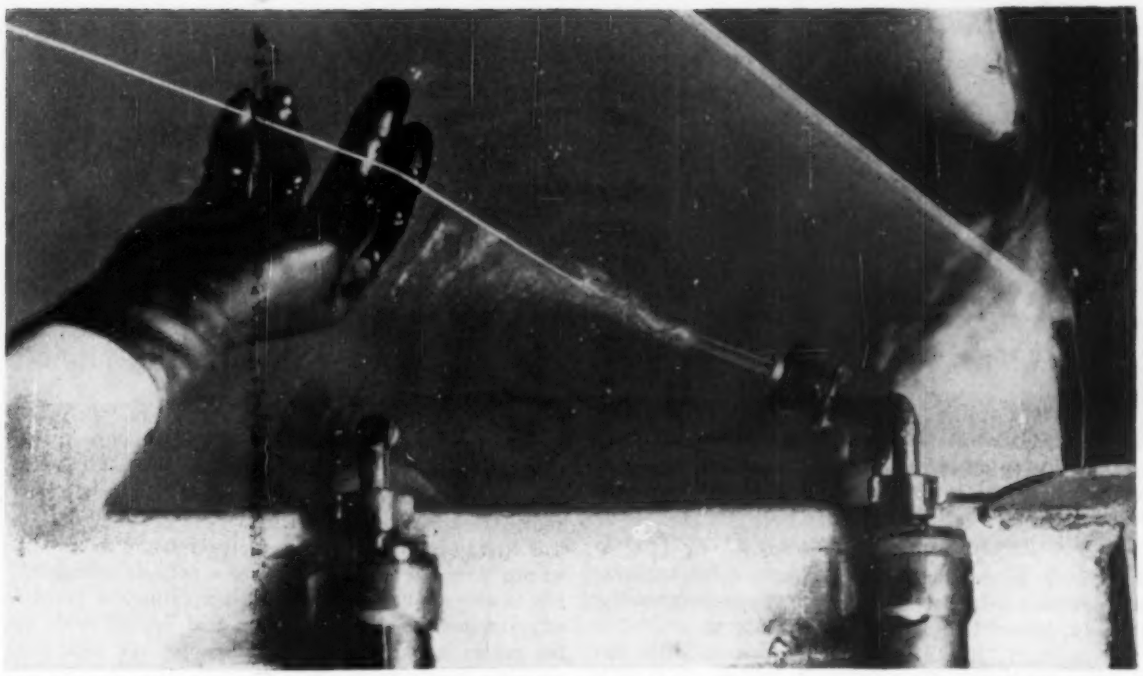
Our General Catalog illustrates and describes these safety products. You'll find information on:

- Edison Electric Cap Lamps
- Respirators—dust and fume
- Eye and Face Protection
- Safety Clothing
- Protective Hats and Caps
- Instruments—for measurement, detection of dusts and gases
- Safety Belts
- Artificial Respiration Equipment
- Gas Masks
- Self-Rescuers
- MinePhones
- Oxygen Breathing Apparatus
- Rock Dust Distributors
- First Aid Materials
- Stretchers

. . . plus hundreds of other products to safeguard against the hazards of today . . . and tomorrow. SEND TODAY FOR YOUR *FREE CATALOG.* Remember too, when you have safety problems, M.S.A. is at your service. Our job is to help you!

MSA
SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES COMPANY
Pittsburgh 8, Pa.
Mine Safety Appliances Co. of Canada, Ltd. Toronto
Mine Safety Appliances Co., Ltd. Glasgow, E-2, Scotland
Mine Safety Appliances Co. (S.A.) (PTY) Ltd. Johannesburg, So. Africa
Representatives in Principal Cities throughout the world
Cable Address: "Minsaf" Pittsburgh, Pa., U.S.A.



RAYON IS MADE by forcing liquid viscose through spinnerets, and is one of the products that made Du Pont a . . .

Pioneer in Foreign Know-How

Du Pont, known the world over as a manufacturer of high-grade chemicals and such modern-age consumer goods as nylon, Orlon, and Dacron, has pioneered in the U.S. in the import and export of technical knowledge

How INTERNATIONAL TRADE in technical knowledge helps to improve the living standards of human beings in many parts of the world is something generally thought of only in theoretical terms. But we have evidence that it is more than a theory.

The E. I. du Pont de Nemours & Co., which just a few months ago celebrated its 150th anniversary, is a shining example of how know-how, as well as capital and goods, can be imported and exported to the advantage of all parties to the transaction—and more importantly, to the consuming public.

In 1802, when Eleuthere Irenee du Pont de Nemours settled on the banks of the Brandywine Creek, near Wilmington, Del., he brought from France knowledge of powder-making, as well as some capital and machinery, to start the Du Pont Co. His knowledge of the process for making quality powder was the most valuable of the various contributing factors that came from France.

More than a century later, Du Pont brought more technical knowledge from France—processes to make rayon, acetate, and cellophane. Du Pont research improved these products, and their cost was reduced as American production increased.

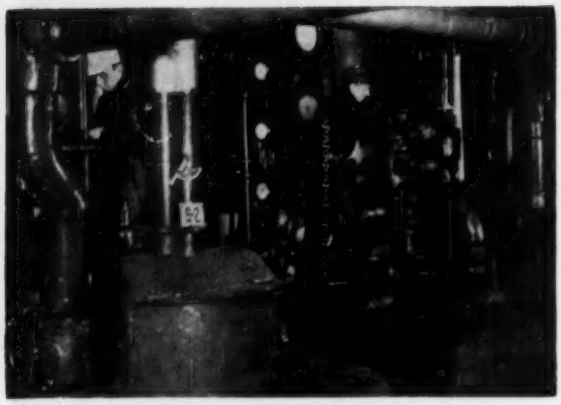
For its part, Du Pont research laboratories have given the whole world many useful products—the most notable recent one being nylon. Other original Du Pont contributions include quick-drying Duco nitrocellulose lacquer, Dulux enamel, neoprene synthetic rubber, Orlon acrylic fiber, and a variety of agricultural and industrial chemicals.

Du Pont's foreign business has been varied. It has exported manufactured articles in substantial volume; it has established some plants abroad; and in some cases it has licensed foreign manufacturers to make products of Du Pont research. In 1951, Du Pont's foreign sales amounted to about $95-million, or 6% of its total sales.

The Du Pont mills on the Brandywine Creek made their first black powder in 1804—a total of only 44,907 lb. for the year. And the very next year, Du Pont started its long history of international trade. In one order, 40,000 lb. of powder were sold to Spain.

The early days of Du Pont saw many changes of fortune. But once the company got on its feet, its growth paralleled that of the U. S. Du Pont explosives played an important part in the opening up and developing of new frontiers. They were used to clear tree stumps, to make ditches; in mining, quarrying, railroad and highway building; in blasting for subways and foundations for skyscrapers; and in a thousand and more other ways.

As Du Pont matured in the U. S., it was ready to expand its operations and put its experience to work



STILL EQUIPMENT, typical of Du Pont's chemical-making operations, is turning out dyestuffs under accurate control at its Deepwater Point plant in New Jersey.

in helping to develop countries beyond its borders. The northern neighbor, Canada, which was progressing steadily, seemed the logical place to start.

Accordingly, in 1910, Du Pont joined with the Nobel's Explosives Co. of Great Britain and with Canadian businessmen in forming Canadian Explosives, Ltd., afterwards renamed, as it diversified its operations, to Canadian Industries, Ltd.

Later, in 1920, the Compania Sud-Americana de Explosivos, of Valparaiso, Chile, was formed, and today Du Pont owns 57% of its stock. It makes various grades of dynamite for the mining industries of both Chile and Bolivia, and sells them under the trademark of Explosivos Tronador. The plant is at Rio Loa, 150 miles northeast of Antofogasta.

The Compania Mexicana de Explosivos, S.A., formed in 1925, acquired and enlarged a plant that had originally been organized by French interests in 1904. This plant is located at Dinamita, near Torreon, in the State of Durango. CME is now a wholly owned Du Pont subsidiary.

In Brazil, commercial explosives are manufactured by the Industrias Chemicas Brasileiras Duperial S.A. of Sao Paulo, formed in 1937, with Du Pont owning about 50% of the stock. The plant, at Barra Mansa, state of Rio de Janeiro, is a modern one.

Contribute to Regional Economies

These three Latin-American corporations have filled an important place in the economy of the regions in which they operate. Mining is the principal industry in Mexico, Chile, and Bolivia, and the location of explosives plants in the vicinity of the mines is a great asset. Explosives from the Brazilian company are blasting tunnels, building roads, quarrying rock, mining metals. A large part of the personnel of each company is made up of nationals of the country in which it is located.

Du Pont's first big venture outside of the explosives field came in 1910 with the purchase of the Fabrikoid Company at Newburgh, N. Y. Those were the days of open touring cars. As Fabrikoid pyroxylin-coated fabrics resisted damage from rain, they were in great demand for upholstery inside the car and on the rumble seat.

Fabrikoid was the first Du Pont trademark to go abroad on anything in the nonexplosive line. One French automobile manufacturer even made a wooden body covered with Fabrikoid. Early advertisements boasted that the limousine of Queen Mother Margherita of Italy used Fabrikoid, "not because cheaper than hide leather, but because superior." For a few years, Du Pont operated Fabrikoid plants in France and Australia.

But development of the all-steel top made a big dent in the export of Du Pont coated fabrics. Since then, new lines have been developed and applied to many things, including decorating and upholstering furniture on ocean liners and binding copies of the Koran.

Luggage makers took many yards of Fabrikoid every year. Once, some material in a design called Buffalo was sent to Brazil. The manufacturer found something wrong with the shipment, made a serious complaint, but to everybody's surprise the complaint was eventually dropped. It was later found that he had made up the entire lot into special neckties for the Brazilian *gauchos* (cowboys).

World War I Interrupts Plans

The outbreak of World War I in 1914 caused Du Pont to sidetrack most of its development and diversification plans and to concentrate on making explosives for the Allies and later for the U. S. But once the armistice was signed, Du Pont was ready to go into foreign trade more aggressively.

An export company was formed in 1919 to handle foreign sales. But it became apparent that this was a rather unwieldy way of handling Du Pont's business, so early in 1922 the foreign business was handed back to the sales organizations of the various industrial departments.

The new program fitted in with the management structure that Du Pont had adopted in 1921. Since 1802, it had been a centralized organization, with one production and one sales department. When explosives made up the bulk of the business, this arrangement worked. But as the diversification program got underway, the company was divided into industrial departments that were responsible for production, sales, and research. Each department was given a considerable degree of autonomy. Five departments were created in 1921, and they have since grown to ten.

An interesting sidelight is that each department picks its own distributors abroad. One concern in Caracas, for example, handles dyes for the organic chemicals department and another one agricultural chemicals for the Grasselli chemicals department.

This may sound odd, but Du Pont believes that the consumer benefits by this arrangement because each distributor is selected to handle products he is best able to service. It makes sense to have a concern that deals with textile mills to represent Du Pont dyes, while another one in the same city, who deals with agriculture, to distribute Du Pont agricultural

chemicals. In a few markets, Du Pont has established its own sales offices.

One of the first products of Du Pont research to become a success all over the world was Duco lacquer. As the automobile industry abroad and in the U. S. grew, it found the paint shop to be a bothersome bottleneck. It took days or even weeks to apply the required coats of paint and varnish, and dry the car thoroughly.

Auto Makers Turn to Du Pont

Automobile manufacturers urged Du Pont to do something about it, so it set research chemists at work to find a quick-drying finish. The result was the development of Duco lacquer, introduced on the 1924 Oakland automobile. The lacquer was an almost immediate success. It filled such an urgent need that an early cable from South Africa, ordering enough Duco to paint 300 cars, added: "Colors in accordance with shades available. Price open."

Within one year, Duco was being exported to 12 countries. In several countries that had automobile industries, Du Pont and local interests built plants to make Duco. This was done in Australia, England, France, Italy, and Germany. Local groups managed and financed the concerns, while Du Pont took a large minority interest, paid for partly in cash and partly through supplying the process and commercial goodwill. Eventually, these businesses were sold out, generally to the majority partners.

Recently, Du Pont's subsidiary in Mexico, Du Pont S. A. de C. V. bought a paint factory at Tlalnepantla in the state of Mexico. With Du Pont management and know-how, its output will be expanded and improved, so that Duco lacquer, Dulux enamels, and other Du Pont industrial and household finishes for consumption in Mexico may be available from local production.

Plastics became a part of the Du Pont line in 1915. In those days the principal plastics products were billiard balls; celluloid collars, cuffs and dickies; combs and brushes, and elaborate "dresser sets"; windows for touring cars. But troubles came too. On one order for 300,000-dozen celluloid collars sent to Germany, 290,000-dozen came back to flood the declining market in the U. S.

FOREIGN-TRADE LEADERS at Du Pont are Wendell R. Swint, director of foreign relations department; H. J. Swezey, director of export sales for organic chemicals dept; and J. K. Jenney, asst. dir. of foreign relations.

DU PONT introduced synthetic detergents into U. S. in 1933. Look at the suds (left) from detergent in hard water and the insoluble curds (right) from soap.

The dye business was one of Du Pont's major undertakings. Scarcity of dyes when supplies from Germany were cut off during World War I affected millions of people in the U. S. There was a real need for an American dye industry.

Confident that American chemists were as smart as the Europeans, Du Pont estimated that for $7-million it could do the research and build a plant at Deepwater Point, N. J., to make dyes and other organic chemicals. As it turned out, it took Du Pont 18 years and an investment of $43-million in dyes and organic chemicals before profits offset total losses.

Du Pont Planned for Exports

In determining the size of the dye works, provision was made for capacity to handle a steady stream of exports, in addition to supplying a large part of the American market. Large sales of blue indigo and sulfur black to China were counted on. Chinese branch offices were opened to handle the expected large volume of business in the Far East.

The Far Eastern dye business fell below expectations because the Germans were soon back in the market. In later years, however, the business prospered. The organic chemicals department today is a big exporter, with the bulk of its exports going to Latin America, Canada, and Europe. In addition to dyes, it sells neoprene, tetraethyl lead, rubber accelerators, synthetic camphor, and many other chemicals.

Not only in dyes, but in many other fields, the American chemical industry was far behind the European in the late 19th and early 20th centuries. For example, little was known about organic chemistry in the U. S. in those days. The few chemists who were familiar with this field either had studied in Europe or had been trained by teachers who had learned their organic chemistry there.

When Du Pont's chemical diversification program

got underway after World War I, it was only natural that it should go to Europe for technical help—just as other countries are now coming to the U. S. for similar help. At that time, this technical knowledge was especially needed in the making of dyes and in high-pressure synthesis of nitrogen.

So Du Pont expanded the contacts it already had with the British Nobel Industries. Du Pont also bought American rights to French and Italian processes for the synthesis of ammonia and nitrogen.

Chemical Know-How Travels Two Ways

Frequently the European companies with which Du Pont dealt insisted that the only way to get their help was to agree to exchange information. If Du Pont wanted to get what they knew, it had to be willing to tell them some of the results of its research.

The amplification of the relations between Du Pont and Nobel was only natural as their contacts in the field of explosives had worked well for many years. The first Du Pont-Nobel explosives agreement, in fact, dates back to 1897. The first general explosives agreement was entered into in 1907.

After World War I, prewar arrangements between Du Pont and Nobel were resumed with the patents and processes agreement of 1920. Nobel became a part of Imperial Chemical Industries, Ltd., when it was formed in 1926, and a general patents and process agreement was then entered into between ICI and Du Pont. This covered explosives and other products of mutual interest, including dyes and ammonia. As research developed new products such as Lucite acrylic resin, nylon, and polythene, various agreements were entered into, covering them.

The Nobel-ICI organization and Du Pont had already become partners in 1910 in the formation of a Canadian manufacturing concern. In the 1930's it was decided to follow the precedent that had been so successful in Canada and to establish jointly owned manufacturing corporations in the east-coast countries of South America. Using part of the word Du Pont and part of the word Imperial, a Duperial corporation—or Industrias Quimicas Argentinas Duperial S. A.—was formed in Argentina in 1935, with a subsidiary in Uruguay.

Duperial Expands Its Operations

A Brazilian Duperial corporation was formed in 1937. The existing small manufacturing and sales organizations of Du Pont and ICI in Argentina, Uruguay, and Brazil were taken over by the Duperial companies and served as a base for further manufacturing development.

In Argentina, the Duperial company, with the participation of some Argentine capital, organized a subsidiary, Ducilo S. A., Productora de Rayon to make viscose rayon in Argentina to supply the Argentine market. Later, its plant, on the outskirts of Buenos Aires, was enlarged to make cellophane and nylon.

Duperial-Argentina also expanded its manufacture of chemicals, including tartaric acid based entirely on the use of Argentine grape residues, and went into the manufacture of finishes, including Duco lacquers and Dulux enamels.

In Uruguay, the Duperial company manufactures an interesting chemical—phenothiazine—originally used as an insecticide. When phenothiazine was found to be effective as a remedy for internal worms in cattle, sheep, horses, and other animals, it found a ready market in the pastoral country of Uruguay, so manufacturing facilities were built there.

In Brazil, Remington Arms Co. (a Du Pont subsidiary) and ICI have a joint interest in the Companhia Brasileira de Cartuchos of Rio de Janeiro. This Brazilian firm makes and sells sporting ammunition and cartridges.

A lot has been said and written, both in the U. S. and abroad, about the so-called Du Pont-ICI cartel case. Here are the facts:

The principal agreements between Du Pont and ICI dated back to the 1920's. Their existence was known to the U. S. government, and no objections were raised until 1941 when Du Pont was confronted with charges of violation of the Sherman Act by allegedly restraining American export trade through its relations with ICI. Formal charges were filed in 1944.

Du Pont contended that its relations with ICI were legal at the time they were instituted and pointed out that many of the agreements challenged by the government had long since been discontinued. The general Du Pont-ICI patents and process agreement was cancelled in 1948.

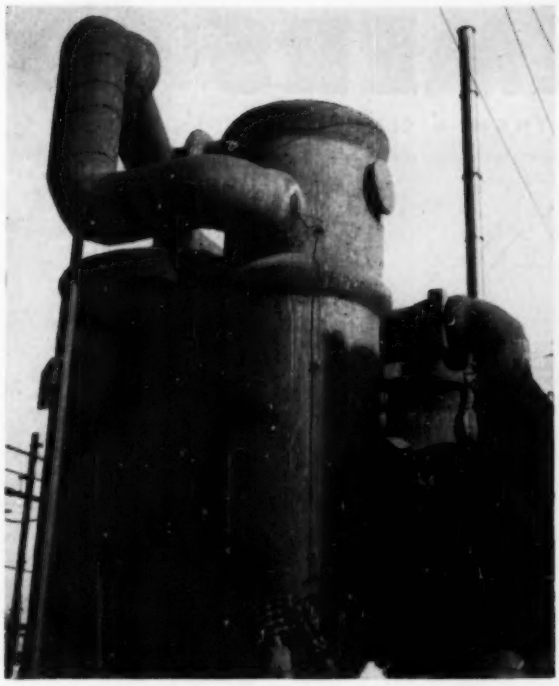
U. S. Court Cancels Agreements

The suit, a civil one generally known as "the ICI case," was brought to trial in the U. S. District Court for the Southern District of New York. Principal defendants were Du Pont, ICI, and Remington Arms Co., Inc.

The court handed down its opinion on September 28, 1951, finding that the companies had restrained foreign trade by virtue of having entered into agreements concerning patents and processes. It also upheld the government's contention that the purpose of the agreements was to divide world markets and that the defendants' joint ownership of some of the companies abroad had the effect of restraining trade. In reaching this conclusion, the court deemed irrelevant "any inquiry into whether the arrangements between the parties injured the public interest or whether the public benefited thereby." Judge Ryan entered his final judgment on July 30, 1952.

In the case of the jointly owned companies, the court ordered the divorcement of the joint interests in Canadian Industries, Ltd., Duperial-Argentina, and Duperial-Brazil, but it denied the government's request for divestiture of the ICI-Du Pont interests in the Chilean Compania Sud-Americana de Explosivos and of Remington-ICI in the Brazilian Companhia Brasileira de Cartuchos, although retaining jurisdiction in this matter for 5 years.

The decree cancels certain agreements between Du Pont and ICI, provides for compulsory nonexclusive



THESE UNGAINLY VESSELS are converters busy making sulfuric acid. Operator is testing for possible condensation. Converter temperature is closely controlled.

NYLON INTERMEDIATE—adiponitrile—is stored at Niagara Falls plant of Du Pont's electro-chemical department before shipment to nylon-manufacturing plants.

licensing on a royalty basis of a number of Du Pont patents, and requires granting of immunities at a royalty under certain Du Pont foreign and U. S. patents to permit exports from the imports into U. S.

But let's look at the way that Du Pont in the past met world-wide demand by licensing the manufacture of products in foreign countries. Nylon is a good example.

First produced in 1938, Nylon was hailed the world over as one of the great chemical inventions of the U. S. The world-wide clamor for nylon was instantaneous, loud, and continuous. Du Pont built nylon-producing capacity in the U. S. as fast as it could, but for a long time the armed forces took most of the production.

Du Pont realized that nylon was such a big thing it could not meet world demand for it from production in its American plants. Instead of building branch factories abroad when world conditions were so unsettled as to make such investments too risky, Du Pont in 1939 granted licenses to companies in England, France, and Germany. Nylon is also made by Du Pont affiliates in Argentina and Canada and by other companies under license in Holland, Italy, Japan, and Switzerland. It will soon be made in Brazil too.

From the black-powder concern of 1802, started with a capital of $36,000, Du Pont has grown into a manufacturer of diversified chemicals with an operating investment of over $1.5-billion. It makes about 1,200 chemical products and product lines.

Many factors are responsible for its growth. But Du Pont officials feel that it has gained many years of time, for itself and the consumer, by having gone abroad for a wide range of processes, especially during the period when the U. S. chemical industry was still on the road to maturity.

Today American costs of production are generally high and many American products cannot successfully compete with similar ones made abroad. But this situation has not adversely affected the exports of articles produced by American science and ingenuity.

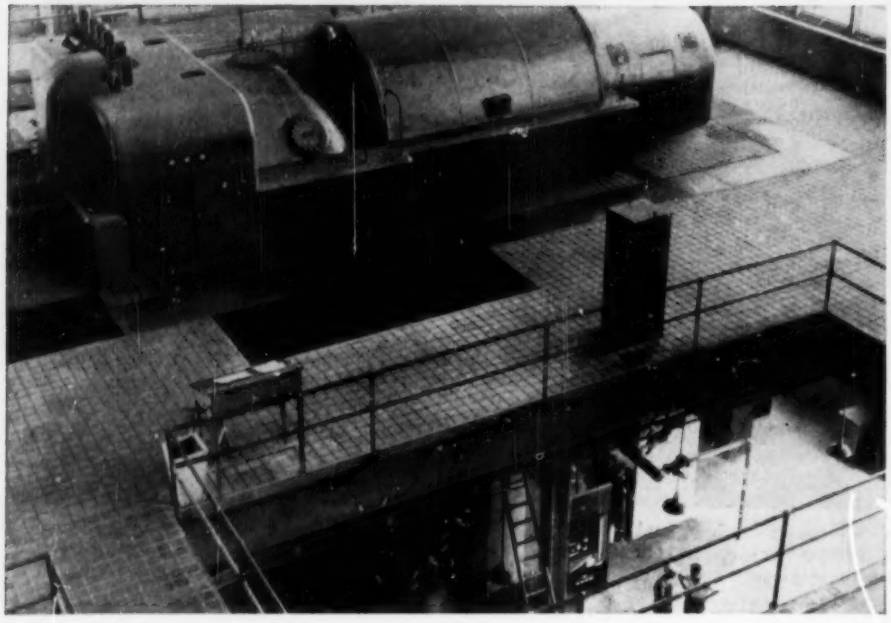
For example, it is hard for Du Pont to sell house paint competitively in some foreign markets where it is able to sell high bake finishes, wire enamels, and other special finishes. X-ray film, tetraethyl lead, nylon, neoprene, agricultural chemicals, and the like find a market abroad despite quotas, tariffs, difficulties in getting exchange, and other barriers.

Du Pont, in making decisions on both its domestic or foreign operations, relied in the past and still relies on its strong belief that the chemical industry is one of change and progress, that it is constantly seeking new, better and lower-priced products and more efficient processes.

But what will come out of the Du Pont laboratories in the next generation, nobody can predict. And whether the foreign demand for new and old Du Pont products will be met from American or foreign plants will naturally depend on circumstances. Like any other prudent investor, Du Pont, when confronted with a decision regarding investing abroad, will naturally select those countries where the record shows a favorable climate for the free enterprise system.

ALLIS-CHALMERS

SERVING ALL INDUSTRY FOR MORE THAN A CENTURY



NEW STRENGTH for Industry

More Power for Venezuela's Industrial Expansion Supplied with Allis-Chalmers Equipment

THE NEW Arrecifes Power Station of the C. A. Electricidad de Caracas, in Venezuela, uses Allis-Chalmers equipment for generating and distributing power.

In the first section of the station Allis-Chalmers supplied a 20,000-kw hydrogen-cooled steam turbine generator unit shown above. Allis-Chalmers also supplied all the condensers, pumps, motors, station power transformers and control equipment.

All the equipment at Arrecifes was designed for operation at either 50 or 60 cycles, to make future changes possible at little expense. In this, as well as in other respects, Allis-Chalmers designed equipment to meet the specific needs of the operation.

Allis-Chalmers can supply part or all of the equipment needed for power generation and distribution. To get complete information, consult the Allis-Chalmers representative in your country, or write:

ALLIS-CHALMERS MANUFACTURING COMPANY
General Machinery Division
Export Department, Milwaukee 1, Wisconsin, U. S. A.

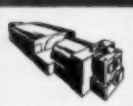
ALLIS-CHALMERS DISTRIBUTORS THROUGHOUT THE WORLD

ALGERIA—Alger.
ARGENTINA—Buenos Aires.
AUSTRALIA—Sydney.
AUSTRIA—Vienna.
BELGIUM—Brussels.
BOLIVIA—La Paz.
BRAZIL—Rio de Janeiro, Sao Paulo, Recife (Pernambuco), Porto Alegre.
BRITISH BORNEO—Sandakan.
CANADA—Montreal.
CHILE—Santiago.
COLOMBIA—Barranquilla, Bogota, Medellin, Cali.
COSTA RICA—San José.
CUBA—Havana.
DENMARK—Copenhagen.
DOMINICAN REPUBLIC—Ciudad Trujillo.
EL SALVADOR—San Salvador.
ENGLAND—London.
FINLAND—Helsinki.
FRANCE—Paris.
FRENCH MOROCCO—Casablanca.
GREECE—Athens.
GUATEMALA—Guatemala City.
HAITI—Port-au-Prince.
HAWAII—Honolulu, Hilo.
ICELAND—Reykjavik.
INDIA—Bombay.
IRAQ—Baghdad.
ISRAEL—Tel-Aviv.
ITALY—Milan.
MALAYA—Kuala Lumpur, Ipoh, Kota Bharu, Penang.
MEXICO—Guadalajara, Mexico City, Monterrey, Tijuana.
NETHERLANDS—Amsterdam, The Hague.
NEW ZEALAND—Wellington.
NICARAGUA—Managua.
NORWAY—Oslo.
PANAMA—Panama.
PERU—Lima.
PORTUGAL—Lisbon.
PUERTO RICO—Ponce, San Juan.
REPUBLIC OF THE PHILIPPINES—Manila.
SARAWAK—Kuching.
SINGAPORE—Singapore.
SPAIN—Madrid.
SURINAM—Paramaribo, Nieuw-Nickerie.
SWEDEN—Stockholm.
SWITZERLAND—Zurich.
THAILAND—Bangkok.
TUNISIA—Tunis.
TURKEY—Istanbul.
UNION OF SOUTH AFRICA—Johannesburg.
REPUBLIC OF INDONESIA—Djakarta, Surabaia.
URUGUAY—Montevideo.
VENEZUELA—Caracas.

Texrope is an Allis-Chalmers Trademark.

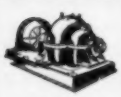
★ ★ BASIC MACHINERY FOR THE WORLD'S MAJOR INDUSTRIES ★ ★

Electrical Equipment



Steam and Hydraulic Turbines, Condensers

Crushing, Cement and Mining Machinery



Centrifugal Pumps, Motors and Control

Flour Mills, Wood Processing Machinery

Texrope V-Belt Drives and Motors

TECHNICAL SHORTS

Identifies Cotton—Positive identification of cotton can be made with a pocket microscope and a few chemicals. Cotton, when treated with a few drops of cuprammonium hydroxide, swells into a series of ballons or beads that appear like a string of beads before they dissolve.—Textile World, Nov, p190

Sweet Music — U. S. electronic musical instrument business will be 30% better this year than last. In 1951, organs alone sold $35-million, amplifiers $1.5-million. Average electronic organ has volume of 50 combined pipe organs or 3,000 home radios, making it excellent for use in public places.—Electronics, Nov, p24

Recovers Waste Hot Air—Instead of allowing hot air from three paper machines go to waste, Minnesota & Ontario Paper Co. recovers the hot air through use of ten economizer units. Hot air passes through each economizer and heat is exchanged with cold fresh air coming in. System saves from $2,100 to $6,600 a month depending on outside temperature.—Factory, Nov, p152

Competition Underfoot—English rubber interests are trying to develop a natural rubber-based material for shoe soling. Called cyclized rubber, it will go into production at a plant near Kuala Lumpur, Malaya, and is expected to compete strongly with soling materials developed in the U. S.—Chem Wk, Nov 1, p45

Porcelain Goes Structural—Porcelain enamelled steel was used on a large scale for the first time in building the 14-story steeple of a church in Birmingham, Ala. The coating, a grey-tinted porcelain with a mat finish to reduce glare, is lightweight, cheap, and never needs replacement or repair. Bettinger Enamel Corp. did the development work. — Business Wk, Oct 25, p84

UN Celebrates An Anniversary

The United Nations turned on the lights on Oct. 24 to remind New York City of the seventh anniversary of its founding. The world organization spelled out a giant UN on the Secretariat building increasing the brightness of the city's night lights. Buildings in foreground are part of Manhattan's East Side; Brooklyn lies beyond.—Elec World, Nov 10, p18

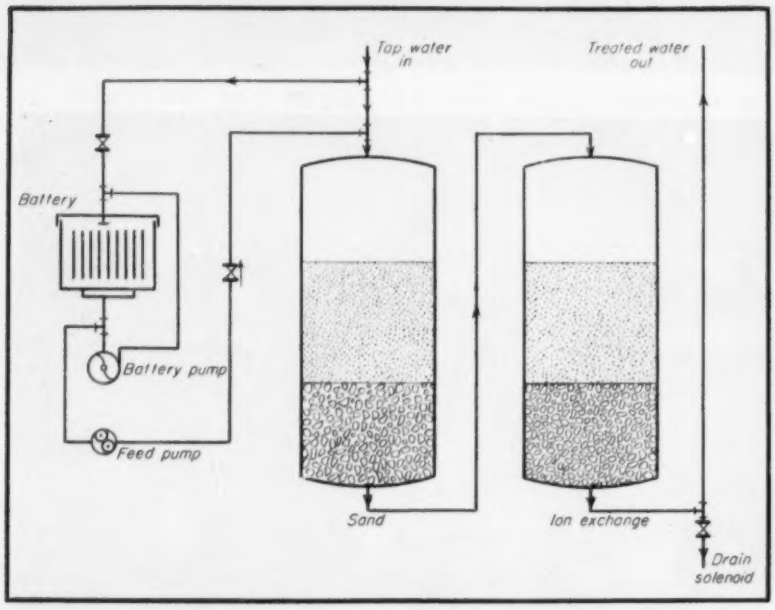
Long Fillet Welds—Largest all-welded steel beam ever made was assembled by Judson-Pacific-Murphy Corp. from structural steel plates 3 in. thick on top and bottom flanges and $\frac{7}{8}$ in. thick on web plate. Flanges and web plate, held in supporting frame, were tack-welded, preheated to 300° F. by torches, and welded, by welding machines with four $\frac{1}{2}$-in. fillet welds, each 106 ft. long. Each weld took 4 hr.—Weld Eng, Nov, p29

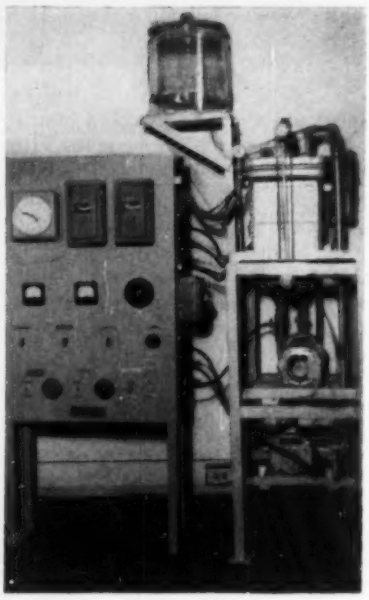
Enamelled Pump — Porcelain enamel is finding new uses in heavy-duty industrial equipment. One such unit is deep-pump housing made by Barrows Porcelain Enamel Co. Smooth enamelled interior surface reduces friction with flowing water and protects pump unit against rusting.—Ceramic Ind, Nov, p35

Preventing Fruit Mold—Fruits packed in boxes and shipped long distances are exposed to abrasion, surface damage, and consequent mold attack. To help remedy this, cartons may be treated with antimycotic agents or the interior may be dry-waxed. Wax makes the inside slippery and the chance for bruising is reduced—Mod Packaging, Nov, p144

New Uses for Tantalum—Superior non-corrosive properties of tantalum have resulted in a fast-growing demand for this metal in the chemical industry. Formerly, electronics industry was the main consumer. Corrosion-resistant properties of tantalum parallel that of glass. Because of its high conductivity, tantalum has been used in heat exchangers in ammonium chloride plants.—E & MJ Met and Min Markets, Oct 23, p7

Water Treatment System Depends on . . . ***. . . This Generator***





Improved Water Treatment

. . . Means better water for better soft drinks with small-bubble carbonation, better flavor, and longer shelf life. Other food uses are expected for this new electrochemical water-purification treatment

SEVERAL SOFT-DRINK bottling plants in the U. S. are getting better water with a new method of electrochemical water treatment. It is:

- Decreasing foaming at the filler and so increasing the bottling rate.
- Saving up to 25% in dry ice for carbon dioxide production.
- Giving "small-bubble" carbonation, corresponding to a retarded release of the supersaturated gas; beverages retain carbonation better on standing and thus have improved palatability.
- Improving flavor and shelf life as organic matter has been removed from the water.

Further uses of this new process, developed by the General Hydro Co., are now seen for treating city tap or well water for brewing and processing dairy products, fruits, vegetables, meat.

It might appear that tap water good enough to drink should be good enough to use for processing beverages and foods. But this is not always true as some water, while potable, is consistently unsuitable for processing and therefore needs treatment.

In other cases, water quality varies because of break-throughs of the filter, microorganisms resistant to chlorination, and seasonal variations such as prolific algae in the summer.

With well water, the distribution system has a great effect on quality. Such water, although pure at the well, may have a high bacterial count at the tap. Hardness and alkalinity too must be modified; alkalinity, for example, is undesirable as it neutralizes the free acid in soft drinks.

Electrochemical method is similar to chemical coagulation in that both depend on formation of insoluble aluminum hydroxide. But it forms the hydroxide directly from the metal with the aid of an electric current.

The treating equipment consists basically of an electrolytic battery, a sand filter, and an ion-exchange unit. Battery and filter purify the water of its organic contamination, while the ion-exchange unit conditions water for hardness or alkalinity, when required. A carbon filter (not shown) is also part of the system.

As current flows through the battery, aluminum hydroxide is generated. The hydroxide is added to tap water, which then flows to the sand filter. The hydroxide absorbs organic matter present in the water and is retained in the sand filter.

Particles of the hydroxide penetrate into the filter, cover the sand

grains, and produce an activated filter. This impregnated filter is fast, as well as effective, because of its openness and an action largely physical and chemical, rather than mechanical.

Water-flow rate and the degree of treatment required determine the aluminum hydroxide needed. Varying the current flow regulates the generating rate of the hydroxide. Generally, current is less than 3 amp. and voltage about 5 volts. Hydroxide feed is usually less than 3 parts per million parts of water.

Operating cost is about 18¢ per 10,000 gal., of which the electrolytic cost is about one-fourth. Additional treatment for alkalinity or hardness, say for 3 gr. per gal. of $CaCO_3$ alkalinity or 7.5 gr. per gal. of $CaCO_3$ hardness, would cost about 50 cents per 10,000 gal. —Food Eng, Nov, p69

Program Trains First, Then Picks Supervisors

In setting up a long-range program of supervisory development, Cities Service Refining Corp. ran into this problem: who should get the training? Cities Service had no reliable method of selecting candidates for training. And how could it prevent men who were not selected for training from developing negative attitudes toward the program and the company?

When these problems were studied, the answer came up: train them all. And, then from tests and careful observations by the instructors, Cities Service would decide for each group who looked like promising candidates as well who positively did not.

The most unusual by-product benefit of the program is it has improved the attitude of most employees and boosted their morale as well. Employees report they have a new appreciation for the difficulties met by their own supervisors in doing their jobs.

There is also an enthusiastic endorsement of the principles of good human relations as developed in the course. Without exception, the graduates underscore good human relations as the surest method of securing increased productivity. —Factory, Nov, p126

Here's the answer to your problem . . .

how to sell in dollar markets

Plan to show YOUR merchandise at the Canadian International Trade Fair in 1953—the Great Dollar Marketplace where, in a few days, you can learn more about the North American market for your product than in a lengthy tour.

22,985 business people from Canada and 1,040 from the United States came to see and buy merchandise exhibited at the 1952 Canadian International Trade Fair.

Get in touch ***now*** with your nearest Canadian Trade Representative—or write direct to the Administrator, Canadian International Trade Fair, Exhibition Park, Toronto 2-B, Ontario, Canada.

1953

CANADIAN INTERNATIONAL TRADE FAIR

TORONTO, CANADA – JUNE 1-12 1953

OPERATED BY THE GOVERNMENT OF CANADA TO PROMOTE YOUR BUSINESS

PRODUCTION SCHEDULING: PRICE AND PAYOFF

TYPE OF SHOP; NUMBER DIRECT LABOR WORKERS	PRODUCTION SCHEDULING FORCE	RESULTS ATTAINED
Large fabricating shop—90 machines 1st shift – 215 2nd shift – 180 3rd shift – 30	1 supervisor 2 female clerks 1 female clerk 1 female clerk	Machine utilization rate increased from 65% to 85% of total hours available. In-process inventory reduced from $45,000 to $22,000.
Small press shop – 15 machines 1st shift – 40 2nd shift – 40	1 man 4 hours/day plus one hour overtime (10-11 p.m.)	Downtime in succeeding departments (for which the press shop is fabricating) reduced by 30%. Idle machine time reduced from 60 to 4 hours per week. Behind schedule deliveries reduced from 3 months' lag to 4 days.
Precision machine shop – 150 machines 1st shift – 400 2nd shift – 360 3rd shift – 300	1 supervisor 1 male, 2 female clerks 1 male, 2 female clerks 2 female clerks	Prevented proposed expenditure of $450,000 for additional machinery by showing up 35% idle time on present equipment.
Small tool and die shop – 30 machines one shift – 18 tool and die makers	1 male clerk	Policy has changed from "scheduling the men" to "scheduling the machines" – using toolmakers as checkers, set-up men, and technical advisers. Since the shop problem was primarily its small labor force, new procedure should triple its production within a year.

PRODUCTION-SCHEDULING CREWS needed in various shops are shown. Workforce is for scheduling only.

What Is Production Control?

What functions does production control take in? How do you organize for effective control? What paperwork is needed? Here are the answers that management will need for effective control

IN FEW FIELDS of industrial management is there less understanding of a stated function than on the subject of production control. A survey of 32 companies showed these results: only 19% had true production control; the others confused production control with material procurement and shop scheduling of production.

Actually, production control means the efficient control of production. It is as simple as that. And a true production-control system provides answers to: what kind, how much, and when.

These things must be known before a production control procedure can be established: (1) how much the sales organization plans to sell and (2) when these sales are going to require delivery. With this information, manufacturing capabilities can be set.

Primarily, this problem translates itself into scheduling the desired quantities of the products or models against a known capacity of equipment and manpower to produce on as steady a base as possible throughout the period. Thus a scheduling section of control is required to allocate sales orders.

Next, the product must be produced. Good organizational structure requires that the manufacturing superintendent be a part of this organization. Finally, a production follow-up section is needed to check and compare actual with scheduled production.

PRODUCTION PLANNING— This is a staff-type function needing a thorough knowledge of market research and analysis, historical statistical product review, and plant production capabilities. These functions can be explained by an actual case history:

In this company, the production-planning group had built up studies that showed sales were 6 to 9% of those for the industry over a 15-year period. They also showed that the trend of this percentage was downward.

A preview of the new models indicated no major change that would influence the buying public. This led the planning group to predict that the company would build 5% of the industry's stated output of 4-million units for the coming year—or 200,000 units. The sales organization violently opposed this estimate and asked management to produce 400,000 units. A compromise agreement of 300,000 units was finally reached.

The production-planning group continued its analytical studies of actual-performance. Materials control was acquainted with the problem, and a production-control decision was reached not to commit the company initially for

materials beyond a 4-month period. Running comparisons of monthly sales compared with the historical average of the proportion of annual sales that should be occurring each month were kept up to date.

By April the analysis had indicated quite positively the accuracy of the production-planning group's original estimates. Firm purchase commitments were held to 200,000 units for the year.

In August the sales department began to see the error in its optimistic forecast. Since the plant was never committed for the original forecast, there was no sacrifice of unused material; nor were production schedules upset unduly. The year closed with actual production of 197,800 units.

PRODUCTION CONTROL—As soon as the sales and production-planning groups have finalized over-all requirements in terms of quantity and models, it is imperative that a detailed schedule forecast be prepared. Basic consideration, in the schedule, should be given to (1) ability to procure material and (2) capacity of the plant to meet the schedule.

A simple but effective method of schedule preparation installed in a major appliance manufacturer's plants works like this:

Step 1—From the industrial-engineering summary of production standards, a listing of final-assembly-department standard jobs per hour by model is determined.

Step 2—A simple columnar worksheet shows models to be built and the working days for four consecutive months. Manufacturing processing analyses have previously determined the model sequence most economical for the plant. Utilizing the standard production per hour by model, simple arithmetic determines how many days it will take to fulfill the schedule.

Scheduling actually is based on a certain percentage of the hourly productivity standard. And that percentage depends on the plant's historical performance. In the plant being discussed, the efficiency ran around 98% to 104%.

Step 3—Once completed, this worksheet of final-assembly daily scheduling was made available for the subassembly or build-up departmental scheduling. Knowledge of the date final assembly was required, plus a knowledge of daily production capabilities in these subassembly departments, allowed similar daily schedules for the buildup groups.

MACHINE LOADING SCHEDULES—With detailed schedules prepared for the subassembly department, the lead-time requirement is available for the preparation of machine-loading schedules for the steel-fabricating operations. This type of scheduling requires different treatment from assembly-type daily scheduling.

Practically all shops use some type of job ticket, or card, that stays with the work. The job card should be revised or adapted to fill the need for adequate information for scheduling.

The card should identify product; part number; die or tool number; operation number; name or number of machine on which job is to be performed; total pieces in the order; standard pieces per hour required; date, start, and stop time for the job; and pieces actually produced.

PRODUCTION FOLLOW-UP—Scheduling production is wasted effort if results are not compared with requirements. In fabricating departments, this follow-up should be a matter of routine. Clerks should determine the cause of failure to meet schedules for all discrepancies over 5%. Corrective measures should be instituted immediately.

Schedule follow-up of subassembly or build-up departments as well as final assembly is a matter of count control at regular intervals. Comparison of these counts warns of impending shortages in build-up departments, as well as adherence to schedules.

MATERIAL RECORDS—The prime reason for establishing material records is to obtain a tool of control over production. All other requirements are secondary.

If production is a repetitive, day-in and day-out procedure with constant material flow to point of use, there is little advantage in issue requisitions. However, in plants having erratic or spasmodic production of varied products or for the control of non-productive items of material, the issue requisition can be a valuable tool of control.

To get control, it is only necessary to route the requisition from the originator to the records group first. Here the requisition is approved and the card record noted that the material is allocated for the specific use intended. The approved requisition is the authority for physical withdrawal. It returns to the records group where the issue is posted and the allocation cancelled.—Factory, Nov, p136

If Your Plant Smells, Try Making Smell Work

The hue and cry about bad industrial odors, getting louder every year, has set researchers to work duplicating them, altering them, stopping them, creating new ones and, most important, putting old ones to work. Industry has learned that it is far better to attack an odor nuisance scientifically and before public reaction sets in.

Odors are extremely complex. There is no cure-all. But some companies have tackled the problem:

The fish canneries in the Los Angeles, Calif., area turned out a fish-meal byproduct. But it smelled. High-temperature incineration removed the odor, but it cost too much. So low-temperature dehydration was developed. It saved the canneries money, made a better product, and produced a better-selling waste.

Odor-like smoke is waste and usually the result of inefficient operations. H. J. Heinz Co. discovered that trapping the good cooking odors and rerunning them through a product enriched it and made it better tasting.

Some companies have found the best way to get rid of odors is to counteract them. Many odors have odor opposites. When equal quantities of both are dispersed at the same time, the combined odor is negligible.—Business Wk, Nov 8, p64

Convention Calendar

(Equipment Exhibited)

Feb 1-Apr 30—Philippine International Fair, Manila.

Feb 25-28—National Vehicle Show & Fleet Maintenance Exhibition, New York, N. Y.

Mar 23-26—Institute of Radio Engineers Show, New York, N. Y.

Apr 20-23—American Management Association's Annual Packaging Exposition, Chicago, Ill.

Apr 27-May 1—Knitting Arts Exhibition, Atlantic City, N. J.

May 11-14—American Mining Congress Exposition, Cleveland, Ohio.

May 18-22—Fifth National Materials Handling Conference, Philadelphia, Pa.

June 1-12—Canadian International Trade Fair, Toronto, Canada.

June 15-19—Exposition of Basic Materials for Industry, New York, N. Y.

Oct 22-23—International Brewing Industries Exposition, St. Louis, Mo.

If you are interested in any of these expositions, either as a possible equipment exhibitor or as a visitor, the McGraw-Hill Digest will be glad to furnish additional information.

Nitrogen in Tool Steel Doubles Tool Life

Use of nitrogen as an alloying element in special steels has practically doubled tool life under certain conditions, Russian metallurgists claim. Published results from 21 experimental heats, to which nitrided ferrochromium was added, show that:

- Nitrogen increases the stability of austenite in the annealed, quenched, and cold-worked high-chromium, high-nickel steels.
- Addition of 0.15 to 0.25% nitrogen replaces 4 to 5% nickel in the manufacture of austenitic steels.
- In austenitic high-carbon steels (over 15% carbon) nitrogen is generally found in the carbide phase.

Results from other heats and tests indicate that (1) nitrogen increases the depth of the columnar zone in tool-steel ingots and (2) nitrogen-bearing low-tungsten chromium-vanadium tool steels can replace high-tungsten steels when the cutting speed is not more than 115 to 130 ft. per min.

Most significant was the effect of nitrogen on tool life of standard tool steels. Tests were made on single-point lathe tools without a coolant. Samples turned were heat-treated to 415 to 420 Brinell hardness. Depth of cut was 0.039 in. and feed was 0.0187 in. Relative tool lifes over standard steels increased 230% for one steel with 0.09% nitrogen and 318% for a second steel with the same nitrogen content.—Iron Age, Nov 6, p163

New Continuous Process Renders Meat Fat

New fat rendering process, developed by Kingan & Co., has proved economical and produces a rendered product that requires less subsequent refining. It replaces four-step, 4-hr. batch rendering with a 15-sec. flash process, costs 15¢ per ton instead of $3, produces a white, bland, highly stable product.

Fat is ground, then pumped to a continuous multi-pass tubular heater of the type used to preheat milk in dairy plants. Heated fat is fed to a comminuter for reducing fat particles to micron sizes. A single-pass, three-phase centrifugal separator then separates the finished fat from solids.

The prototype commercial system now in use can process 2 tons of beef fat per hr. Fat yield is over 90%, compared to 70% with the batch method. The increase in yield was almost as great when lard was run.

Product quality is excellent. Oleo stock is rendered by the new process to a high-quality fat that suggests its reintroduction into quality margarine. Lard from this process is completely free from odor.

A commercially engineered "package" version of the process is expected to be put on the market soon by a leading equipment manufacturer. — Food Eng, Nov, p72

Amines Cut Corrosion, Reduce Maintenance

Heater failures and piping replacements were sharply reduced at the A. O. Smith Corp. by use of filming amines in the heating system. The plant is a large one, covering 30 acres, with over 50 buildings and a heating volume of 50-million cu. ft.

Steam is used for both process and heating with the result that heating units and connecting lines cannot be properly cleaned. Average replacement each year of 16 to 24 of the 635 unit heaters because of corrosion proves how bad the situation was before amine filming.

The initial injection formula was 15 lb. of amine per million lb of steam entering the combination process-heating system. Corrosion potential rapidly dropped to below the critical point of 0.005 in. of penetration a year.

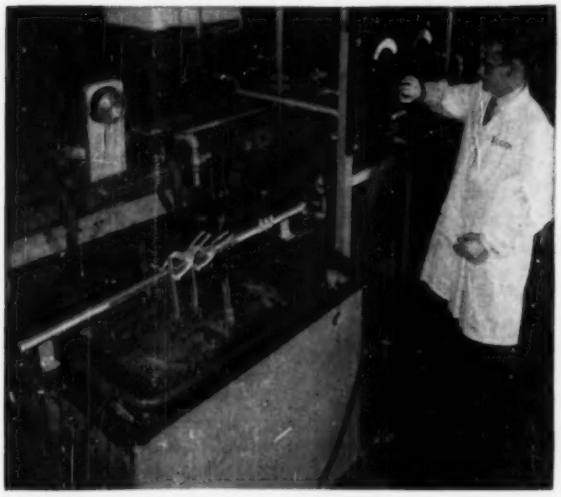
To prevent mass dislodgement of rust and scale that might clog strainers and traps, A. O. Smith advises beginning amine injection gradually. The large initial dose loosened scale and deposits of foreign matter too quickly.

So far, Smith has saved $5,500 per year, average, and is satisfied that filming amines are an excellent way to take the bite out of corrosion.—Power, Nov, p116

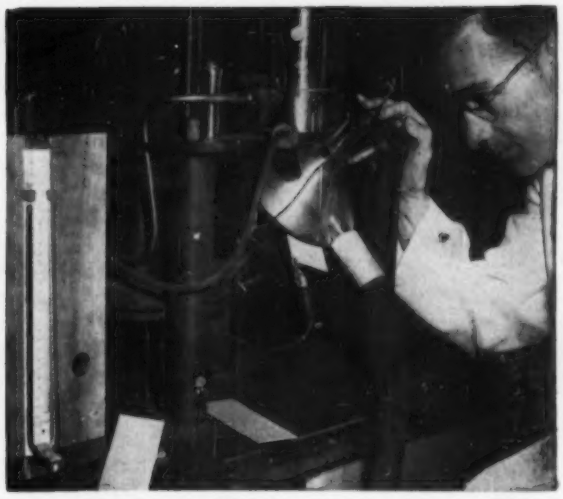
Plane Seating

To counter the U. S. Civil Aeronautics Board's proposal that all passenger aircraft seating be turned to face rearward for greater passenger safety, William L. Littlewood, American Airlines vice president of engineering, reported recently that rearward seating would prove safer in one instance only, when plane crashes head on.

For more passenger safety, Littlewood suggested, instead, Orlon seat belts with greater elasticity, a few cabin modifications, and rigid seats. The reclining seat will gradually become unnecessary as aircraft speed rises and flight times are cut. With rigid seats and Orlon belts, passengers should be able to stand a 25G deceleration.—Aviation Wk. Nov 3, p15



COATING ALUMINUM ALLOYS with hard abrasion-resistant coating is done by immersion in anodizing tank.



HARD COATING is tested for abrasion resistance by impinging an abrasive on the coating from a blast nozzle.

Aluminum Finish Wears Well

Harder, thicker, and denser anodic surface coatings have considerably better resistance to wear and abrasion and may help replace heavier metals

RECENT IMPROVEMENTS in anodizing procedures produce oxide coatings of greater thickness (0.001 to 0.005 in.) and increased density. The coatings can support greater loads and have better resistance to scratching or indentation-type abrasion than do thinner anodic coatings. The extra thickness makes the coatings highly resistant also to corrosion and gives them high dielectric strengths.

For applications involving resistance to rubbing or erosion, Aluminum Co. of America's Alumilite coatings 225, 226, 725, and 726 and Glenn L. Martin Co.'s Hard Coatings are recommended. The 225 and 226 coatings are for wrought alloys, and the 725 and 726 for cast alloys.

Wear resistance of the hard anodic coatings has been determined by both rubbing and grit-blast erosion tests. Rubbing tests were made on a Taber abrasion tester, and blast-erosion tests on an abrasimeter.

The first instrument employs a rotating abrasive wheel in contact with the specimen, whereas the second directs a blast of grit on the coating under test. Testing with these instruments has shown that the new coatings are more resistant to rubbing abrasion than to blast-type abrasion.

Some results: A Taber tester at 50,000 cycles showed a Martin Hard Coating 2 mils thick to wear only half as fast as case-hardened steel. In grit blasting, resistance to abrasion of hard coatings is double that for ordinary anodic coatings.

Hard coatings are produced in acid-type electrolytes at low temperatures and high-current densities. Exceptional agitation and circulation of the electrolyte must be maintained to avoid burning in areas of high current density.

Alloys having 7% or more of silicon or high percentages of copper and silicon should not be hard-coated. Coatings can be formed on wrought alloys 11S, 14S, 17S, and 24S, but operating conditions are critical and the coatings are not so resistant to abrasion as those formed on alloys 2S, 3S, 52S, 61S, and 75S.

Honing hard anodic coatings to a high finish and lubricating them give even better results for applications involving rubbing abrasion. Satisfactory lubricants are molybdenum disulfide and various graphite compositions applied to the surface of the coating.

Who can use hard anodic coatings? They offer possibilities in many fields. The aircraft industry is already using or considering them for such parts as gears, pinions, bearing races, gun blast tubes, slides, various pistons, and helicopter-blade edges.

Another application is on all-aluminum orthopedic brace with the hard coating applied to joints for increased wear resistance. Others are products subjected to erosive action of hot gases or liquids, such as high-velocity pumps and blower impellers.

Aluminum alloys may also be coated with other metals to get desired properties. Hard chromium plating on aluminum increase surface hardness and wear resistance. One such use is the cylinder bores of small two-cycle gasoline engines. The die-cast cyl-

... and reduce your clerical costs by 40 to 60%!

Easiest to use of all the accounting machines! You can get all the benefits of modern, mechanized accounting without upsetting your accounting department. Your present employees, *familiar with your procedures,* can learn to operate this machine in 30 minutes!

100% electric! The operator simply enters amounts and descriptions on the electrified keyboard, which has only ten numeral keys for all figure work, and a standard typewriter keyboard. The rest of the accounting job is done automatically, *by the machine itself,* giving you completed and proved records with up-to-date balances.

Why not ask a specially-trained representative to call on you ... or, if you prefer, stop in today at your local Remington Rand office and see this all-electric accounting machine at work. Offices in principal cities *throughout the world!*

Remington Rand INC

Room 9360
315-4th Ave.,
New York, N. Y.
U. S. A.

inders are chromium-plated to increase output.

If the application requires a softer metal, tin, brass, or lead may be coated on aluminum surfaces. Tin coatings have been applied to aluminum-alloy automobile pistons to prevent scuffing during initial operations. Brass coatings have been used for similar applications.—Iron Age, Oct, 30, p81

Electrolytic Grinding Removes Metal Rapidly

New grinding process using an electric circuit between the work and a diamond wheel removes metal by anodic dissolution. Super-Cut, Inc., and Norton Co. have worked on the development (as has United Drill & Tool Co.—McG-H Digest, May '52, p42).

Hammond Machinery Builders is delivering electrolytic grinders, while Super-Cut is marketing a conversion kit to adapt regular tool grinders to the process.

The work is made positive, and the wheel negative. An electrolyte containing aluminate or silicate salts is applied in the area between the work and tool. Spacing between them is maintained at 0.001 in. or less by the diamond bort in the wheel.

The diamond wheel does not grind away the work—this is done by electrochemical means. In grinding carbides or steel, the diamonds remove oxides that form on the work. If not removed, the oxides would slow the reaction.

Experimental grinding of chip breakers at Ford proved the process to be twice as fast as diamond grinding. Other tests showed a 7% increase. Speed of metal removal seems to vary with the carbide and the electrolyte.

Electrolytic grinding gives finishes 4 mu-in. rms. The surface produced has many small oval-shaped mounds rather than the usual parallel grooves.

No exact information is available on costs. One estimate gives wheel cost as $107.87 per cu. in. of carbide removed with a regular diamond wheel, as compared to 68¢ for wheel cost with electrolytic grinding.—Am Mach, Oct 13, p189 and Nov 10, p151 and 154

Painting Tanks Means Longer Useful Life

Success in maintaining storage tanks depends on proper selection, proper application, and proper care of the painted surface. But the success of the paint job depends on priming the surface before painting.

Pittsburgh Plate Glass Co. in its manual "Pittsburgh Paints for the Petroleum Industry" gives these pointers for good tank care:

1. Inspect the surface thoroughly before, during, and after applying the primer.
2. Clean and prime all rusting and marred spots.
3. Remove all rust, scale, and old paint on sandblasted jobs, and apply primer promptly before any rusting takes place.
4. Keep spraying equipment in good order. The paint in the pot must be free from skins and of the right consistency. If paint sputters from the gun, cleaning of the paint or repairs to the gun may be needed. If paint sags, it may be reduced excessively, wrong thinners may have been used, or the operator's spraying technique may be faulty.
5. Have your paint inspector watch carefully for flaws during application. Skips should be corrected, and care taken that paint is not applied too thinly. Paint spread should vary from 25 to 30 sq. yd. per gal.
6. Apply two coats of paint to give proper protection. The second coat is needed to give adequate film thickness.—Oil & Gas J, Oct 20, p176

Surface Porosity in Submerged-Arc Welding

Surface porosity was causing R. G. Le Tourneau, Inc., Texas plant lots of trouble in weldments fabricated by the semiautomatic submerged-arc process. Pinholes continued to show in welds on cases, flywheels, transmission cases, box beams, and other parts, many of which had to be oil-tight.

Tedious search finally pinned down the porosity to three main causes: impure flux, arc voltage too high, and arc blow.

Metal particles, dirt, and moisture were ruining the reclaimed flux.

A magnetic separator was installed on the reclaimer to screen out the metal particles, and a miniature furnace to drive out the moisture.

The high arc voltage was caused by fine metal particles nicked off by welding-head drive wheels slipping on the electrode wire. The particles caked inside the cable and gun assembly, thereby making the wire harder to push through the cable and increasing the arc voltage by as much as 10 volts. Remedy was a cleaning fluid of two parts of flake graphite and four parts of carbon tetrachloride to keep hose clean and to lubricate inner surface of the cable.

Arc blow, always a trouble with direct-current welders, was eliminated by building an alternating-current welder. An a-c. transformer-type welder was modified to semiautomatic welding.

Revamping jigs and welding procedures also helped to eliminate arc blow. Welding a box beam, for example, on a 15° slope downhill practically eliminated all surface porosity.—Weld Eng, Nov, p38

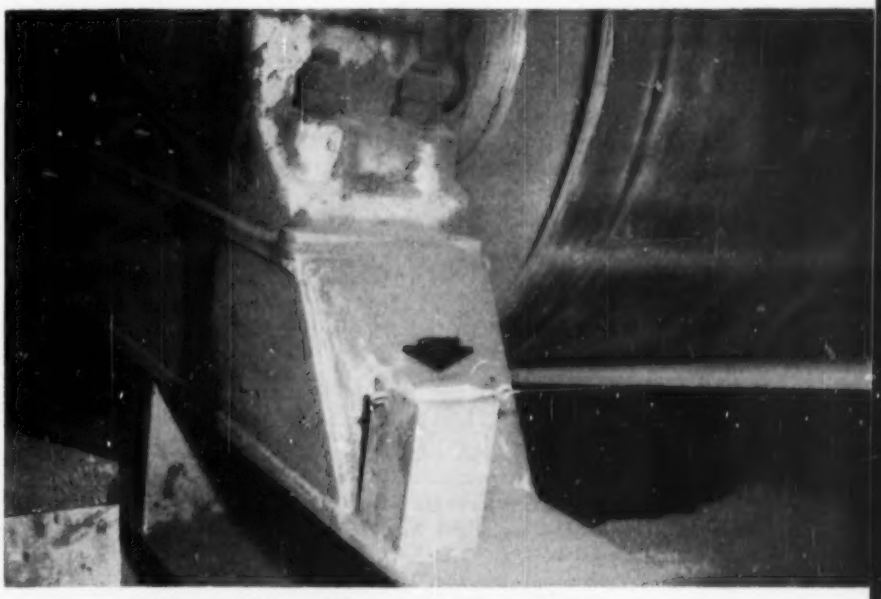
Nylon Bearing Parts

Development work in both laboratory and field for the past several months has proved the value of molded, stamped and machined nylon ball-bearing parts, such as races, cages, and seals.

Chief advantages are noise reduction and corrosion resistance. Steel balls on plastic races are quieter than on steel races, even if only one of the races is made of plastic. Uses: business machines, household appliances, automobiles, doors, drawers.

High corrosion resistance opens up other fields of use, particularly in the chemical industry. Typical uses are pump bearings for the petroleum industry, high-speed bearings for aircraft where exhaust gases are involved, and bearings for photographic process equipment immersed in water or developing solution.

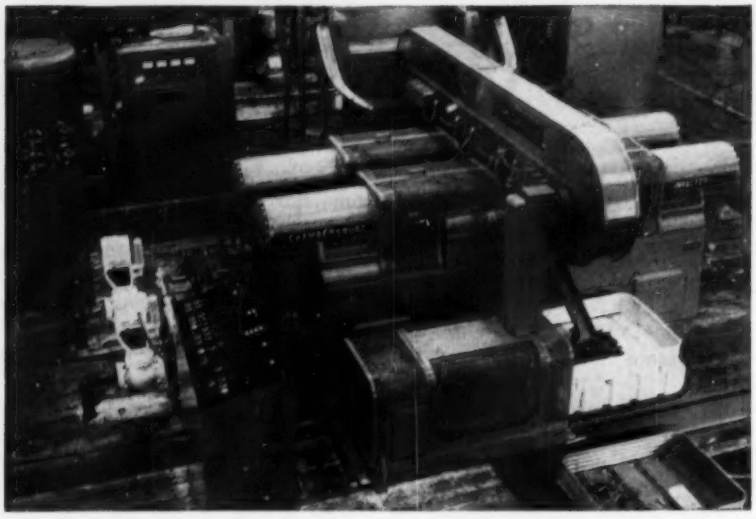
As a rule, nylon has been confined to low-cost bearings of the commercial class for low-speed, lightly loaded use. Speed seems to be as critical as load because nylon cold-flows at high operating speeds. —Prod Eng, 1953 Annual Handbook, pC30



Piano Wire Cleans Conveyor Belt

The superintendent of Panther Coal Co., Inc., calls it "the best belt cleaner we have found." All it consists of is a turnbuckle and 5 ft. of piano wire. The wire, which clears the surface of the belt by about 1/32 in., is located within a few inches of the belt's final contact with the head pulley where it maintains a constant distance from the wire. As the belt goes by it, the wire cuts clinging particles from the belt.—Coal Age, Nov, p89

NEW PRODUCTS



Impacter Forges in Mid-Air in New Metalworking Process

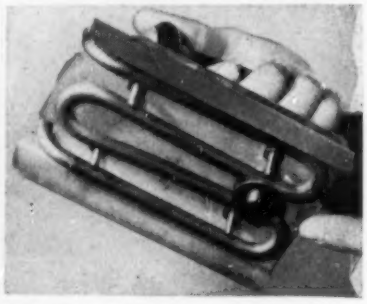
Fundamentally new forging process —actually forging in mid-air with work struck from opposite sides by a pair of dies—is done in new Cecomatic Impacter. Basic principle is that when two inelastic bodies of equal mass and traveling at the same speed collide, they come to rest with complete absorption of energy.

In the Impacter, the two bodies are called impellers. Each carries one die on its face and is actuated by compressed air. Metered shots of air send them together at equal speeds.

Stock suspended between dies absorb all the energy as it is forced to shape. External shock and vibration are eliminated; neither machine nor floor vibrate during operation. Another advantage is that the amount of metal movement is less than in conventional forging because metal is moved from both sides rather than one. Thus, in forging a sphere to a disk, 23% less energy is needed.

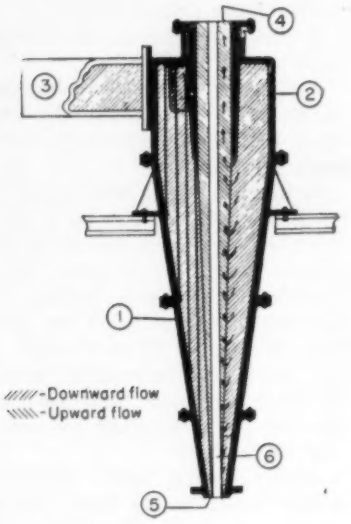
The method is easily adapted to automatic handling of work. When two blows must be struck, two machines are installed side by side as above. Present applications include forging jet blades and cold forging of knife handles. Jet-blade production data indicate that one Impacter will do eight to twelve times the work of a hammer.

Engineering has been completed on machines ranging in capacity from 4,000 to 400,000 ft.-lb. per blow.—**Chambersburg Engrg. Co.** —Am Mach, Nov 10, p194



Paint Remover

Paint remover consists of two skids under which is mounted a Calrod tubular heater rated at 1000 w., 115 v. When device is slid along painted surface, heat from unit causes paint to soften and blister. It can then be removed with a putty knife. Weight is 2¼ lb., and length is 6½ in.—**General Electric Co.**—Power, Nov, p154



Cyclone Unit Cleans Pulp of Sand, Grit, Other Dirt

Centri-Cleaner is a cyclonic pulp cleaner that may permit using unbarked pulpwood, increase pulp yields by recovering fibers present in the bark, and remove fine dirt particles. It separates bark, specks, and other lightweight solids from pulp-fiber slurries.

Unit consists of hollow truncated cone (1) attached to cylindrical head (2). Stock mixture at 40 to 50 lb. per sq. in. enters tangentially at inlet (3). Clean pulp is ejected at the top (4), while dirt passes out at the bottom opening (5).

Cleaning and flow are caused by pressure differential from periphery toward liquid-free axis (6) and the bottom, by centrifugal forces, and by angular velocity gradient from periphery to liquid-free axis. Unit capacities are from 0.5 to 60 tons per day.—**Bauer Bros. Co.**—Paper Ind, Oct, p861

Blends Paint, Catalyst

New spray painting gun is specially designed for applying the new epon resin paints. Blending of paint and catalyst is accomplished with a dual-feed head on the gun. Both are blended after they leave gun.

The spray gun is essentially a heavy-duty production gun with the precision catalyst feed system added. Exterior location of the catalyst nozzles lets the operator keep a close check on the flow of catalyst.—**Binks Mfg. Co.**—Ind Dist, Nov, p133

Crawler-Mounted Dragline

New P & H Model 1855 is claimed to be the largest dragline ever mounted on a single pair of crawler frames. Four separate Magnetorque units control every motion of the 8-yd. unit. Friction clutches are eliminated entirely. The ease and smoothness of operation that results means an absence of shock loads and an increase of daily output.

It can handle an 8-yd. bucket with a 120-ft. boom, or a 7-yd. bucket with a 150-ft. boom, and is powered by a 590-hp. diesel engine. Hoist-line speed is 246 ft. per min. —**Harnischfeger Corp.**—Coal Age, Nov, p118

Inert Butt-Welders

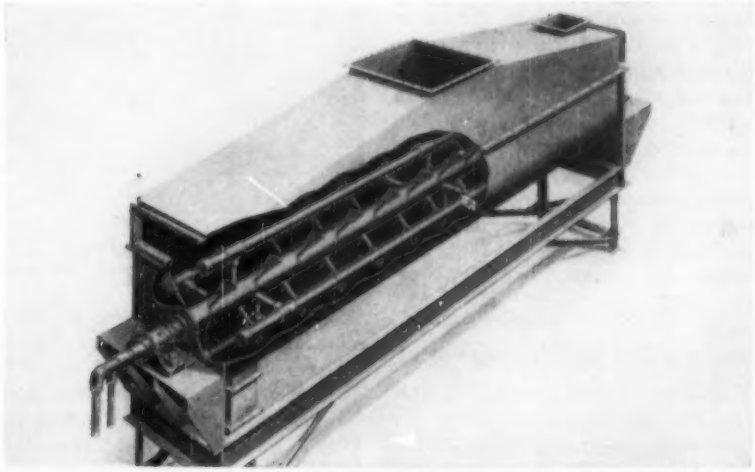
Two models of inert-gas-shielded butt-welders are claimed to give high-quality welds in aluminum or stainless steel. Machines were originally designed to weld aircraft and jet-engine parts. Special holding clamps hold work firmly during welding. Filler rod may or may not be used, depending on gage and kind of metal being welded and end use of product.—**Solar Aircraft Co.**—Weld Eng, Nov, p58

Compact Home Freezer

Freezer of 20-cu. ft. capacity requires no more floor space than a 15-cu. ft. unit, utilizes new compact type glass-fiber insulation, and has a 700-lb. food storage capacity. "Dri-Wall" construction gives dry-exterior cabinet with fast freezing on five inside walls. New features include an ice-cube storage caddy, four level release ice-cube trays, a plastic serving tray on which dessert can be placed for quick freezing, three lightweight stainless steel storage baskets and two dividers. An alarm bell and a warning light serve as signals in case of power failure.—**International Harvester Co.**—Elec Merch, Nov, p139

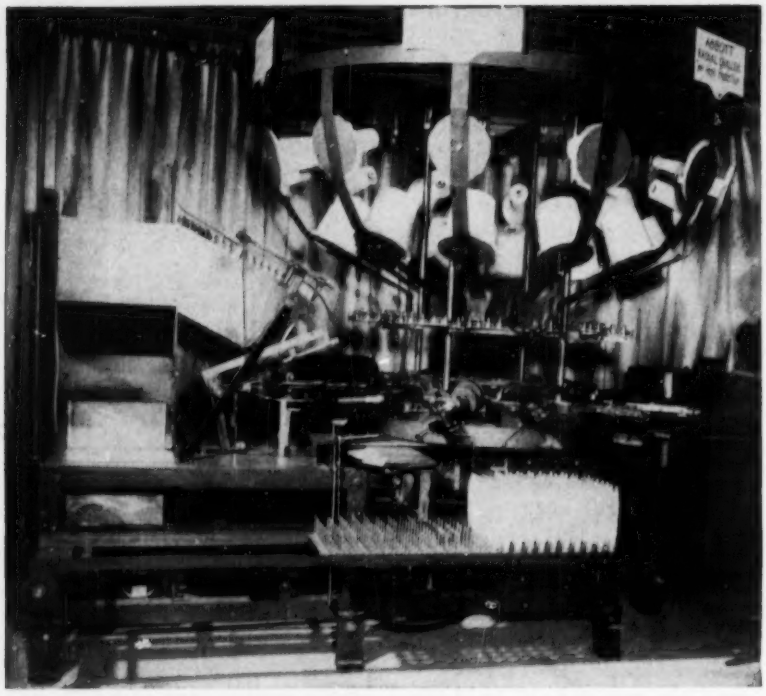
Television Tube

Small camera tube for industrial television permits pick-up with 100-200 ft.-c. of incident illumination on the screen. Tube provides 400-line resolution, employs magnetic focus and deflection, and operates on relatively low direct current. It measures 1 in. in dia. and approximately 6¼ in. in length. —**Radio Corp. of America**—Electronics, Nov, p332



Conduction Dryer Saves Fines

Economical drying and cooling, coupled with by-product and solvent recovery, are among the advantages claimed for the compact Monotube dryer. A paddle conveyor on a hollow shaft is the only moving part. No air currents flow through material bed. Heating and cooling temperatures are controlled by selection of material flowing through shaft and out-rigger tubes. Dryers are made in trough dia. of 24 in., 5 to 10 ft. long; or 30 in. dia., 5 to 20 ft. long.—Link Belt Co.—Chem Eng, Oct, p178



Quiller for Small Mills

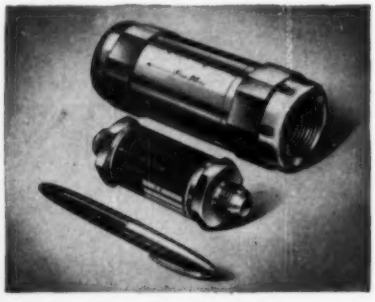
An automatic radial quiller for winding cotton, spun rayon, wool, and worsted yarns has been developed. The new quiller is designed for smaller mills and for mills with widely diversified production.

The radial quiller, in addition to its small size (12 winding positions and the machine occupies only a 5½ x 7½-ft. floor space) has several improvements. Tensioning is done with tensions arranged in a curve to eliminate snubbing and to enable threading up without yarn going through any holes. The machine can be equipped with an automatic pinboard attachment or can doff into baskets.—**Abbott Machine Co., Inc.**—Textile World, Nov, p137

Bakery Leveler-Dispenser

Faster work with less worker fatigue is the result of using the Lowerator-Dispenser in bakeries. Unit is suitable for pans, peel boards, and icing trays. It is powered by a spring mechanism that keeps the working level at a convenient height. Level is maintained whether unit is fully loaded, half-filled, or empty.

Unit eliminates stooping, bending, and lifting. It also reduces accidents and improves employee morale. — **American Machine & Foundry Co.**—Food Eng, Nov, p119



Surge Damping Valve Opened by Pressure

When pressure is applied to inlet side, valve opens and allows gradually accelerated flow until valve is fully open. Valve resets when flow is interrupted. Uses for industrial model—larger of two shown, the other being an aircraft model—are as port of four-way or reversing valves; as an automatic decompression valve in a cylinder circuit; or in any line leading from an accumulator or any part of a circuit that has a flow suddenly started after having been static. — **Denison Engrg. Co.**—Prod Eng, Nov, p209

NEW PRODUCT BRIEFS

Allows Easy Conversation—Mobile radio is designed for communication between office and moving vehicles. Units operate on a very high frequency band. Either three-unit packaging (transmitter, receiver, and power supply) or single package unit are available. A wide range of models with various input voltages and power outputs are also available.—**Bendix Aviation Corp.**—Am Business, Oct, p57

Plastic Hose Nozzle — Tenite II, cellulose-acetate-butyrate, nozzle for garden hose is durable, corrosion resistant, lightweight. "O" ring set into inner barrel prevents backward seepage of water.—**Vlchek Tool Co.** — Mod Plastics, Nov, p120

Pipe Insulation—Scotchrap is a polyvinyl chloride tape for wrapping pipe lines to provide pinhole-free cold coating. It protects against corrosion and chemical attack and provides dielectric qualities of 10,000 to 22,500 v. according to thickness.—**Minnesota Mining & Mfg. Co.**—Oil & Gas J, Oct 27, p147

High-speed Diesel Engine—Cat D 326 is offered in industrial, electric set and marine arrangements. Engine is six-cylinder unit with 5¼-in. bore and 6-in. stroke.—**Caterpillar Tractor Co.**—Power, Nov, p168

Teflon Sheets — Perforated tape and sheets of Teflon are available for filtering and sifting corrosive chemicals and other materials. Hole sizes in tape run from 0.020 to 0.062 in. and in sheets 0.035 in. and larger. Sheet sizes are up to 2x2 ft.—**U. S. Gasket Co.**—Food Eng, Nov, p131

Polyvinyl Chloride Resin—Pliovac G90V features outstanding thermal stability. It is recommended for universal use in calendering, extruding, injection molding, and conventional molding of vinyl materials. High bulk density makes handling and interchange with other resins easier.—**Goodyear Tire & Rubber Co.**—Factory, Nov, p340

TRUSCON *Residential* STEEL DOORS

for residences, apartments and multiple housing projects

Swing type doors and frames are made in popular sizes. May be installed singly or in pairs. Are made in solid panels, or with glass inserts or louvers.

Sliding type doors are available for openings in widths of 3′ 0″, 4′ 0″ or 5′ 0″ (.914, 1.22 or 1.52m). The doors are furnished in pairs as shown above.

...are beautiful and strong

...will never warp or shrink

...can save you money

No longer need you worry about a shortage of wood for doors and frames. No longer need your doors warp, sag, shrink, swell, stick or crack. Truscon Residential Steel Doors end all this — because they are made of strong, durable Republic Steel.

These doors are beautiful, modern in design and strongly built to withstand hard service. They may be used in all types of modern construction.

Installation is quick and easy . . . no fitting, cutting or planing is needed. They always open easily . . . close securely and quietly in any weather, wet or dry, hot or cold . . . never need refitting.

Truscon Residential Steel Doors and Door Frames are furnished complete—with all necessary hardware, hinges, knobs and frames — at attractive prices made possible by large quantity production.

Truscon Steel
Division
Republic Steel Corporation

Export Department
Chrysler Building • New York 17, N. Y.
General Offices: Youngstown 1, Ohio
Cable Address: "KAHNCRETE"

REPUBLIC STEEL — FREEDOM'S FORGE FOR THE WORLD

TRUSCON

WORLD'S LARGEST MANUFACTURER OF STEEL BUILDING PRODUCTS

Continuous Casting—New Process For Steel

The steel industry now has a machine that can turn a heat of steel into a semi-finished product in one self-contained process. It is Freyn Engineering's (Koppers Co., Inc., department) continuous-casting plant. The whole operation is set up vertically. Molten steel goes in at the top and comes out as slabs at the bottom.

Freyn is cautious about the scope of the market for its casting machine. It says continuous casting will not remake the operations of major steel producers. They would turn out too much steel for a casting plant to handle. And sufficient casting machines to handle the capacity would be impractical and costly.

On the other extreme, the casting process is not suitable for small-capacity producers. The best capacity for a casting machine runs between 200,000 tons and 300,000 tons per year of rolling-mill products. Even so, these figures hold only if the machine is suitable to the conditions and economies of the customer. Freyn sees three possible customers:

Replacements: A medium-sized producer who wants to scrap obsolete equipment.

New Products: A producer who wants to get into a new line, for which his equipment is not suited.

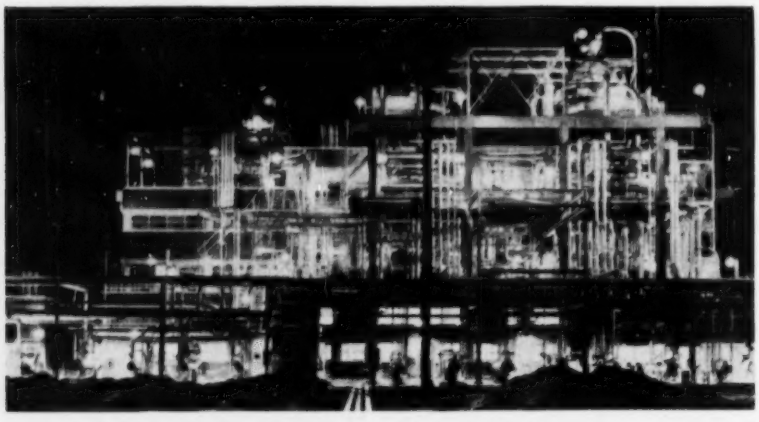
Production Bottlenecks: An operator who has an unbalance of capacities among his individual operations.—Business Wk, Oct 18, p68

Aluminum Feeders

Lightweight aluminum feeders, in an otherwise all-copper distribution system, connect the main switchboard with local distribution centers in the new 22-story addition to Standard Oil Company of California's San Francisco office.

These risers are connected to copper switchgear through cadmium-plated copper solderless lugs, and conveyance of feeders through the building is via Transite ducts. Feeder conductors are of stranded hard-drawn aluminum with Neoprene-sheathed insulation. Cable strain is relieved in the vertical risers through the use of split-wedge supports.

Though aluminum-feeder diameter is larger than copper diameter, there is an over-all weight reduction up to 35%. Weight was frequently reduced as much as 200 lb. per riser, which facilitated cable handling and pulling. Using mechanical and hydraulically-compressed plated-copper connectors and an oxide-cutting corrosion-inhibiting joint compound to assure high electrical conductivity, this aluminum copper combination system is proving economical and efficient.—Elec C & M, Nov, p77



Rebuilt Dunkirk Refinery Opens

This night view is the lubricating-oil section of the rebuilt Dunkirk refinery of Soc. Generale des Huiles de Petrole. Refinery, opened officially this fall, is now running close to 50,000 bbl. per day. Daily capacity is 5,000 bbl. of lubricating oils, 1,000 bbl. of asphalts, 60,000 lb. of waxes. A 5,500-bbl. Platformer is scheduled for completion in 1954.—Oil & Gas J, Oct 20, p93

Generator Output Raised

Reduced generator output plagued the Tennessee Valley Authority's Hales Bar hydro plant on the Tennessee River, especially during warm weather. Outside engineers, called in to study causes of the trouble, found that 14 air-cooled generators labored in temperatures that often soared past 120° F.

Checks on climate showed it was too hot to cool the generators automatically. Large-scale ventilation appeared necessary.

Thirty-two bifurcator-type roof ventilators were installed to remove 400,000 cu. ft. of air per min. from the plant. Generator output rose and working conditions were vastly improved.

Ventilators were fitted with weather heads, arranged in parallel series and mounted on roof exterior. Roof mounting allows easy maintenance without interfering with main generator output.—Power, Nov, p94

New Slasher Handles Cotton, Synthetics, Wool

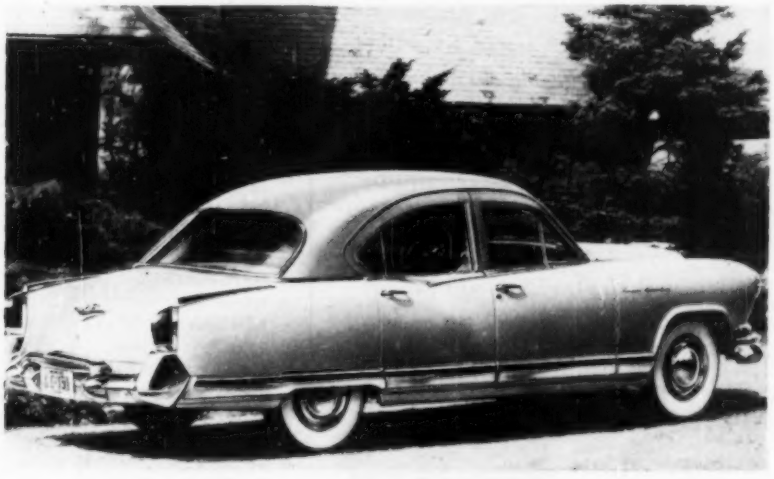
Complete uniformity in sized warps is possible on the new slasher made by Tower Iron Works, R. I. Head ends of the slasher incorporate these improvements:

1. Location of the loom beam puts the comb in easy reach of the operator.
2. Main controls are grouped in a panel at the operator's finger tips.
3. The loading of the pressure roll is positive and accurate since pneumatic power is used.
4. Rolls are turned and polished and are mounted in ball bearings that are in turn mounted on welded steel frames.

The size box features pneumatic loading of squeeze rolls, an efficient steam coil and an insulating jacket, a stainless-steel size box and rolls, and an automatic self-locking immersion-roll lifting mechanism.

Creels have electrically controlled pneumatic brakes to control stretch. Beams are supported by adjustable ball-bearing units.—Textile World, Nov, p144

DODGE, with new body and chassis styling, has lower, softer lines and more glass area. Outstanding feature is new V-8 140-hp. Red Ram engine that has 7.1 to 1 compression ratio.—p85



KAISER-FRAZER accent is on passenger safety with cushioned dash panel. Horsepower has been stepped up. New upholstery is vinyl and fabric.—p103

Accent on New Styles

SOFTER lines, better visibility, more driver comfort and greater safety are characteristic of U. S. cars recently announced. Dodge's new Red Ram V-8 engine, with 7.1 to 1 compression ratio, is typical of the trend toward higher powered, more efficient engines. Several 1953 models have adopted 12-volt electrical systems to handle increased load of air-conditioning, similar accessories, and higher-compression engines.—Am Auto, Dec

PACKARD has new low appearance. Power braking, power steering, and air conditioning are offered.—p48

PLYMOUTH's restyling includes new front-end and fender design. Horsepower has been raised to 100.—p88

All Over the World

Oil Millers Turn to ANDERSON *for Vegetable Oil Extraction Equipment*

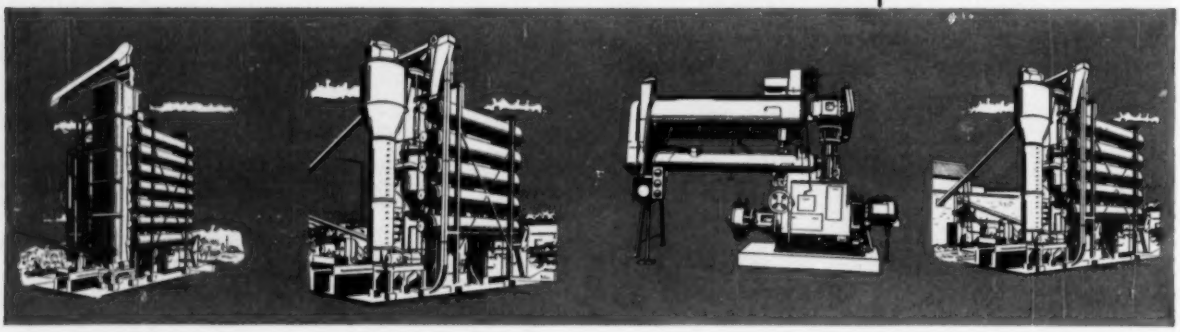
Anderson vegetable oil extraction systems help oil millers all over the world get more quality oil and meal out of raw materials. Anderson offers a full line of vegetable oil extraction equipment: Various Expeller models ranging from 3 to 45 tons per 24 hours in capacity, Solvent Extraction plants including total immersion and basket type plants as well as Exsolex plants combining Pre-Expellers and Solvent Extraction. In addition, Anderson supplies all types of quality supplementary equipment such as Cookers, Dryers, Screening Tanks, Flake Conditioners and many others.

From over 50 years experience as a leader in the extraction equipment field comes Anderson's advanced engineered machines and processes. This experience plus carefully selected materials, assure you of a top performer in every Anderson machine. Send for literature and prices. Write today.

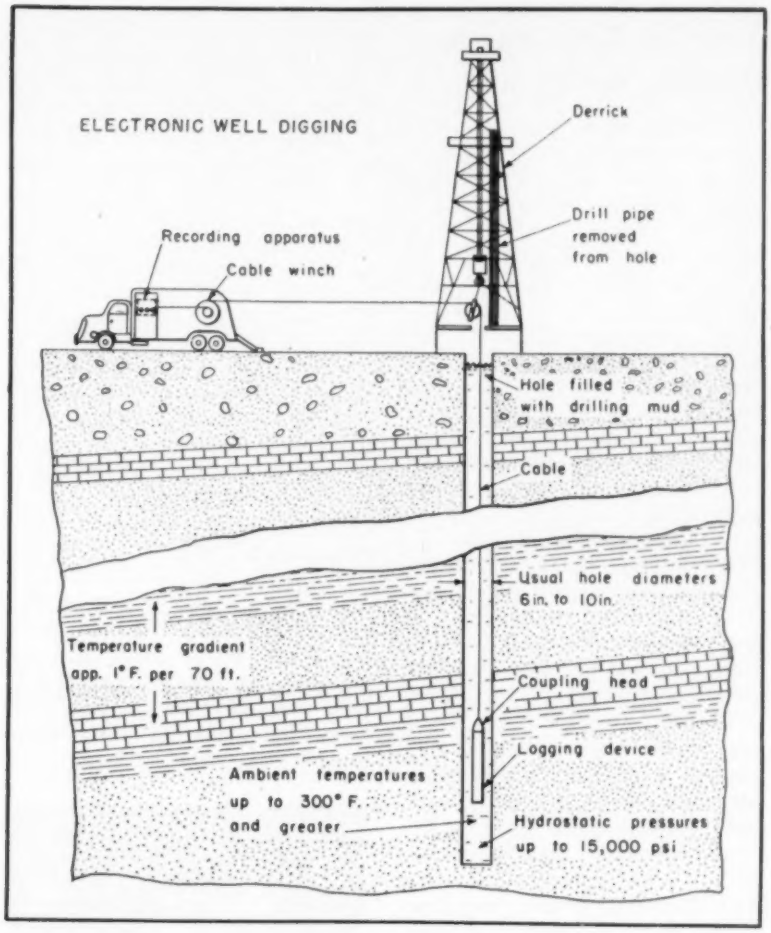
THE V. D. ANDERSON COMPANY
1945 West 96th Street • Cleveland 2, Ohio

NEW 52-PAGE CATALOG. Contains photographs and descriptions of all types of extraction equipment supplied by Anderson. Write for your copy today.

AFRICA
ALASKA
ARGENTINA
AUSTRALIA
BELGIUM
BRAZIL
CANADA
CEYLON
CHILE
CHINA
COLOMBIA
COSTA RICA
CUBA
DENMARK
DUTCH EAST INDIES
DOMINICAN REPUBLIC
ECUADOR
ENGLAND
FIJI ISLANDS
FRANCE
GREECE
GUAM
GUATEMALA
HAITI
HAWAII
HOLLAND
HONDURAS
FRENCH INDO CHINA
INDIA
IRELAND
ITALY
JAMAICA
JAPAN
JUGOSLAVIA
MEXICO
NEW ZEALAND
NORWAY
PANAMA
PERU
PHILIPPINE ISLANDS
PUERTO RICO
SCOTLAND
SOUTH SEA ISLANDS
STRAITS SETTLEMENTS
SWEDEN
TRINIDAD
URUGUAY
U. S. S. R.
VENEZUELA
WEST INDIES



Basket Type Solvent Plant | Total Immersion Solvent Plant | Super Duo Expeller | Exsolex


ELECTRONIC WELL DIGGING
Derrick
Drill pipe removed from hole
Recording apparatus
Cable winch
Hole filled with drilling mud
Cable
Usual hole diameters 6 in. to 10 in.
Temperature gradient app. 1° F. per 70 ft.
Coupling head
Logging device
Ambient temperatures up to 300° F. and greater
Hydrostatic pressures up to 15,000 psi

Oil-Well Electronics

Electronic devices such as the mobile magnetometer, scintillation counter, low-frequency electromagnetic apparatus are speeding up exploration

FINDING AND DRILLING oil wells is an expensive business in these days of high costs for practically everything. So when any instruments make the job easier, quicker, and cheaper, the industry welcomes them gladly. And that is the case with electronic instruments.

Two recent developments are the mobile magnetometer and the scintillation counter. The magnetometer, usually flown by airplane over the area being explored, was adapted from a World War II submarine-locating device. It is a flux-gate-type instrument that depends on saturation of a high-permeability core for its high sensitivity.

The scintillation counter, in the expanding field of radioactivity exploration, may replace the Geiger counter. Its operation depends on the flashes of visible or ultra-violet light emitted by certain crystals, such as anthracene or naphthalene, when exposed to ionizing radiation. Light flashes are detected by a photomultiplier tube, amplified, and counted.

In detecting the desired gamma-ray signals from radioactive earth materials, the scintillation counter produces a countable flash for almost every gamma ray reaching the crystal. This is nearly a hundred times as sensitive as the Geiger counter. The undesirable effect of cosmic radiation is decreased in the same proportion by the scintillation counter.

More sensitivity and improved signal-to-noise ratio allow valid readings to be made with scintillation counters over shorter time intervals and permit the recording of radioactivity profiles from low-flying aircraft.

Electronic instruments for exploration include the recently developed low-frequency electromagnetic equipment for measuring subsurface conductivity. An alternating magnetic field is transmitted to the earth from a large horizontal coil carried by one man. Field produced by induced eddy currents is detected by a similar coil carried by a second man.

Electronics is also becoming more important in well logging, which is the process of making subsurface measurements in bore holes. Such measurements are made in holes drilled for oil, water, or minerals. They include: resistivity, spontaneous potentials, radio-activity, seismic-wave velocity, temperature and temperature gradients, hole size, hole direction, and magnetic susceptibility.

These measurements are generally made, as shown in the illustration, by lowering into the hole a cable carrying necessary devices. Thus, for radioactivity logging, a counter and a considerable amount of circuitry are contained in an electronic cartridge.

At the surface, recording equipment is connected to the upper end of the cable, which contains one or more insulated conductors. This equipment may be mounted on the same truck that carries the cable winch.

The illustration indicates some of the conditions encountered that affect design of the equipment lowered into the bore hole. Logging devices must be small enough to enter 6-in. holes easily, so they are usually made from 3 to 4½ in. in dia. and of various lengths, depending on circuits needed. They must be able also to withstand high hydrostatic pressures, temperatures, and humidities.—Oil & Gas J, Oct 20, p152

of

PIPE and TUBING

may be realized by installing a low-cost Yoder Cold-Roll-Forming, Electric-Weld Tube Mill. Cold or hot rolled strip is fed continuously into the mill, coming out as finished pipe or tubing, automatically cut to length.

Furnaces and other expensive heating equipment are entirely dispensed with, greatly reducing not only the initial investment, but also labor, maintenance and fuel cost. The only fuel needed is current for welding purposes, a negligible item of cost.

Mill speeds up to 400 feet or more per minute are practical. One operator and a helper will produce from 20,000 to 100,000 feet per 8-hour day, in sizes up to 3" o.d. For larger sizes, though speed is slower, tonnage production is greater.

You have the choice of electric resistance, induction and arc welding. Only Yoder offers you this wide choice. Yoder engineers are at your service in explaining the advantages of these respective types of welding and in determining the type best suited to your individual needs. Literature and further information for the asking.

THE YODER COMPANY
5517 Walworth Ave. • Cleveland 2, Ohio

Resistance Weld TUBE MILLS

ENGINEERING YODER MANUFACTURING

You Can Cut Costs by Choosing the Right Truck

In selecting the best vehicle for your operation, the first step is to determine the type of work it is to do. Here are some questions to consider: What can be done by a change in type of chassis, redesign of body, relocation of lower fifth wheel, upper fifth wheel, trailer axle? What type of power take-off will increase usefulness of the truck? What modifications will improve driver comfort, increase safety, and result in better accessibility, ease and economy of maintenance?

Changes in the original specifications may make a unit adaptable to more than one type of work. The non-standard body design may produce a considerable saving. But these specialized units are costly. Unless the savings are clear, they should be avoided.

The next question, after deciding on the type of vehicle best adapted to the job, is how about facilities for loading and unloading? In addition to standard materials-handling equipment like fork lifts and conveyors, there are tailgate elevators and drag lines designed to fill specific needs. Careful planning for the use of such equipment will help make a successful investment in trucks.—Fleet Owner, Nov, p54

World's Biggest Sphere To House Sub Reactor

Safety of off-site residents was the prime consideration in designing a 225-ft. steel sphere to house a nuclear submarine power plant being built by the Atomic Energy Commission for the U. S. Navy.

The sphere's foundation is 179 ft. in dia. and 38 ft. deep. It contains 18,000 cu. yd. of concrete. A ring of 2 steel columns, 74 ft. high, outside the sphere and reaching to its equator, will give further support to the structure.

The ball will be made of 682 butt-welded plates, each about 9x32 ft. by 1 in. thick. As soon as supporting columns are in place, the first ring of plates forming the sphere will be placed around the equator, and assembly will proceed both upwards and downwards. The plates will be erected with a derrick mounted atop a temporary central steel tower.

Meanwhile, the hull of the submarine will be assembled outside the building. When the sphere has been completed and tested, the hull will be moved into it through a removable wall section, and then it will be sealed again.

The sphere will have two entrance locks, each consisting of a 16½-ft. sphere. This shape was chosen to obtain circular intersections with the large ball to avoid points of stress concentration. Welds around entrances will be stress-relieved prior to assembly. Doors will be of the double, watertight, ship bulkhead type.

The reactor will use liquid sodium metal to take heat from the reactor core and conduct it into an exchanger where water will be converted to steam. The steam will then drive the turbines that propel the submarine.—Eng News-Rec, Oct, 23, p29

Encased in Plastic

Fan blades of Koppers Co.'s Aeromaster cooling tower are protected by a plastic coating of cellulose acetate butyrate applied to the laminated wooden blades by dipping. Plastic protects blades against abrasion, moisture, corrosion, fire. Coating, called Aeroloid, was developed jointly by Koppers and Tennessee Eastman Corp. —Chem Wk, Nov 8, p61

SPARE MACHINES are not moved to the face; instead, mine keeps working sections available for production crews

PM Adds to Production

This mine gets uniform production and few major breakdowns at minimum cost with spare working sections and special maintenance crews

PREVENTIVE MAINTENANCE (PM) is Tennessee Coal, Iron & RR Co.'s answer to the problem of establishing uniform production at minimum cost. Key to the program at TCI's Concord mine is the rotation of loading crews to spare sections equipped with machinery in top operating condition while their machinery is undergoing periodic inspection and repairs. According to TCI, it is easier and cheaper to move men than equipment.

As a result of the program, section production has increased. Other results are less downtime, increased savings in material and parts, and lower equipment repair costs.

Maintenance work is scheduled well in advance, and all section personnel are given notice when a special maintenance crew is to take over. The production crew is moved to one of the spare sections where it has at its disposal equipment in top operating condition while its regular equipment is being serviced.

When the maintenance job is completed, the production crew returns to its regular section and the maintenance crew moves to another production section whose crew then goes to a spare section.

Duties of the special maintenance crew are to change oil, inspect bearings and replace when necessary, inspect and repair moving parts, make minor repairs and adjustments, and replace unit assemblies as needed. All major overhauls on machines and rebuilding of unit assemblies are done in the main repair shop above ground.

When a major breakdown occurs or a unit assembly needs to be replaced on any of the equipment, the section repairman first calls the main shop and reports the trouble. Then he returns to the equipment to begin removing the assembly or parts. Considerable time is saved and the equipment is returned to production quickly.

Lubrication has been the subject of careful study and tests by TCI engineers. As a result, only three types of lubricants are used, as against five previously. Reducing the lube types to three has simplified purchasing and storage problems as well as use. Identification of lubricant is made easy by painting each drum a color to correspond with a color code for type of lubricant.

On major overhauls, TCI so far does not have a time schedule. Most of its equipment is too new. But TCI expects to start major overhauls once a year. Management feels that such a program is preventive, rather than necessary, and will result in better operating efficiency. The whole plant is aimed at avoiding major breakdowns at a time when maximum production is desired most.—Coal Age, Nov, p102

Redesigned Hangers Cut Fuel Cosrs and Rejects

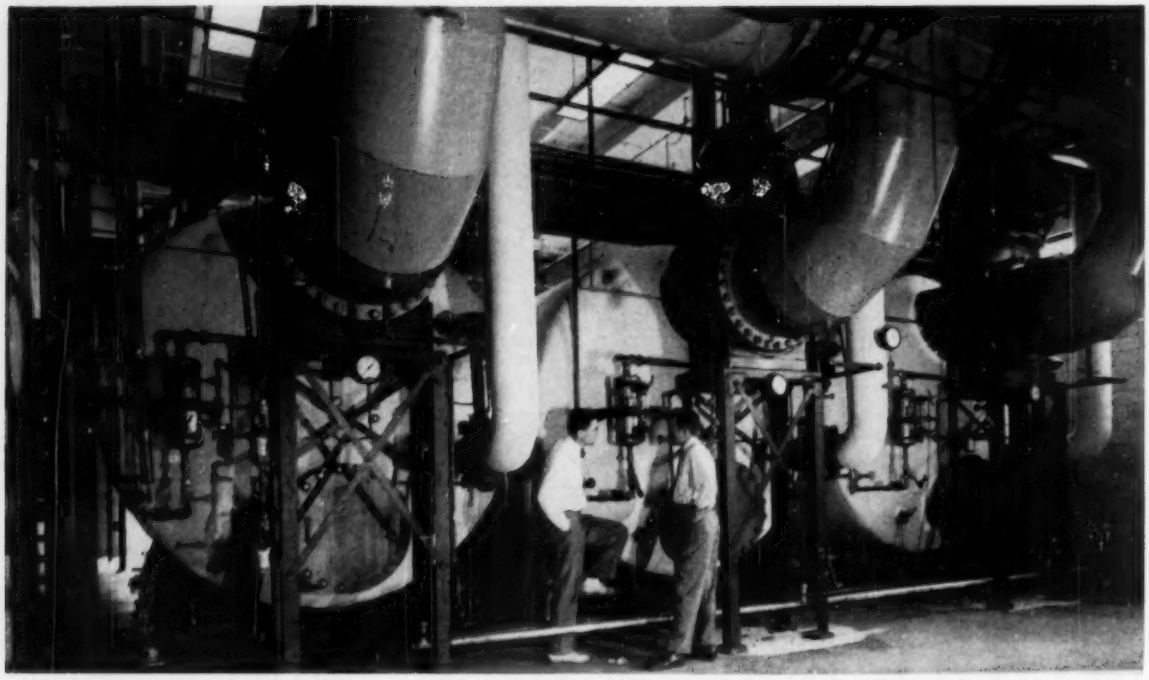
Redesigning its burning tools used when firing in a continuous furnace gained Borg-Warner Corp.'s Ingersoll Product Div. these advantages: (1) fuel saving, (2) few rejects, (3) less conveyor wear, (4) more easily cleaned hangers, (5) less maintenance.

Old hangers for enameling of washer tubs were double-deck units weighing 31½ lb. each. On the conveyor, they were joined to form a continuous chain.

New hangers, made of Inconel, weigh only 24 lb., thereby saving over 860 lb. for the 115 hangers. Further weight is saved by the new hangers not requiring pin rings to support tub bottoms and eliminate cold spots. Less tooling weight means less fuel needed to bring the furnace up to the desired temperature.

The new units hang free, whereas the old were joined. As the long line of old hangers passed through the furnace, the drop rods would rub on the furnace roof, causing dirt to drop on the ware. The new hangers eliminate this source of rejects.

Cleaning the hangers is now easier. The old had to be sandblasted. The new are dipped in sulfuric acid, rinsed, neutralized, and then cleaned with a wire brush. —Ceramic Ind, Nov, p62



SCIENCE is steadily replacing art as practice becomes better related to theory, processes improve and . . .

Adsorption Comes of Age

A bigger role lies ahead for adsorption as a unit operation. New specialty adsorbents are being developed; old standbys are becoming better understood; equipment and methods are undergoing systematic research

ADSORPTION is a unit operation in chemical technology, fast growing but not as well-known to the average chemical engineer as absorption, distillation, or extraction.

It is a powerful device, capable of successful application to some of the most difficult separations of both liquids and gases. With certain improvements in adsorbents and adsorption processes, it will be expanding into many new fields and extending its importance where it is already in use.

New adsorbents will arrive largely to satisfy an economic need, with emphasis first on cost and then on service life, regeneration, and stability in use.

Fullers earth and clays are the adsorbents now in heaviest tonnage. They are characterized by low cost, wide availability, good regeneration, and relative chemical inertness. These adsorbents will probably undergo minor improvements in preparatory processing.

Bauxite has come into the picture because of cost considerations and it is expected to increase in importance. Ways of lengthening service life are already in the developmental stage.

Bone char is the tonnage adsorbent of the sugar industry and is low in cost. Synthetic competitors such as hydroxyapatite Synthad are now undergoing plant research.

In decolorizing-type carbon, the largest tonnage is in the low-cost "water carbon", made from by-product or waste material.

Gas adsorbent carbons are high-cost materials, but their multitime use and specialized characteristics offset this to a degree.

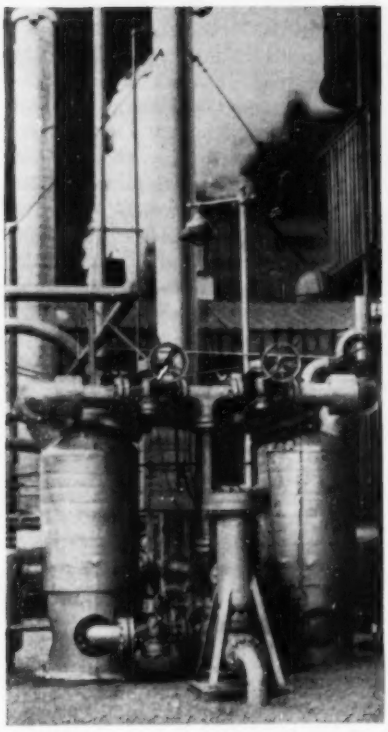
Of the ion-exchange materials, synthetic zeolites are the low-cost tonnage materials where great advances have taken place in manufacture, particularly in employment of solar energy and mechanical harvesting. Resin exchangers are expensive and fragile, but they have a great range of application.

Greater application of adsorbents to aid human metabolism is evidenced by the use of carbons for detoxication and ion exchangers for controlling salt ingestion.

Where price is of secondary importance, more varieties of tailor-made adsorbents will be developed. This is especially applicable to the pharmaceutical industry where cost is not the primary consideration.

Processing methods will be refined and streamlined to keep pace with new adsorbents.

Percolation, used in sugar refin-



ADSORPTION DEHYDRATORS such as these 600-lb.-per-sq.-in. units will be more widely used

ing and for clay-bleaching of oils, deposits impurities in the adsorbent. Here, improvemens will come mostly in equipment design, materials handling, and regeneration equipment rather than in adsorbents.

Contact filtration, which often uses the adsorbent one time only, will develop more multi-time uses of specialized adsorbents on a large scale. There will be greater application of inorganic materials, including salt.

Fixed-bed adsorption, now found in dehumidification, odor removal, and solvent recovery, will call for more abrasion-resistant, harder, and stronger porous forms. The major development, however, will tend toward more automatic operation and lower utility consumption.

To eliminate the hazards of gas hydrate formation and corrosion, petroleum and natural-gas industries will put more millions of dollars into dehydration of gases.

Odor-removal and air-recovery systems, as adsorptive adjuncts to air conditioning, should expand markedly, partly from such highly publicized units as the one installed in the United Nations building in New York.

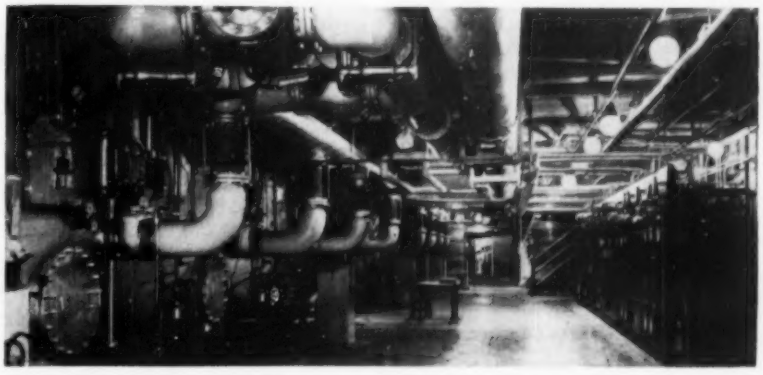
Hypersorption, used heavily to recover ethylene and purify methane, should have future applications in hydrogen and synthesis gas purification, propane and butane recovery, removal of nitrogen and sulfur from natural gas, nitrogen purification, acetylene recovery, and other petrochemical fractionations.

Fractionation of liquids in columns is already being used by the Sun Oil Co. for adsorbent fractionation of aromatic hydrocarbons from petroleum fractions. This plant uses silica gel. Fractionation of ions, developed largely in connection with fission products of atom disintegration, has replaced the long, tedious multi-crystallizations method.

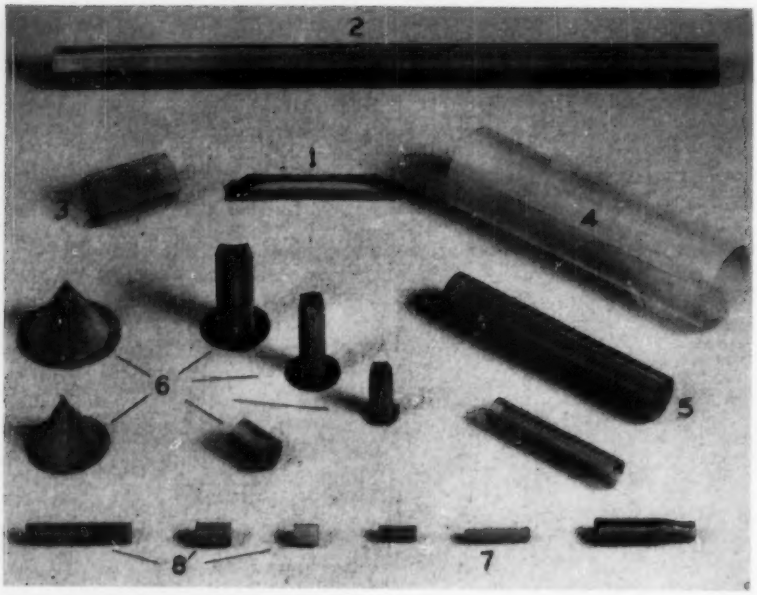
Ion-exchange applications are growing rapidly. Demineralized water will be more and more in demand by the process industries. Deionization of organic materials in multiple selective steps will center around more automatic equipment. Dehydration and fractionation in series is really stepwise fractionation, but employing different types of adsorbents. For large throughputs, moving-bed apparatus will probably be adapted to dehydration.

Corrosion prevention, particularly in long, large-volume transportation systems such as natural-gas lines, petroleum-product lines, and gasoline distribution systems, has been achieved to a large extent by dehydration of the materials transported. There will be increasing application of adsorption dehydration units in the future, employing rugged adsorbents, developed on the basis of units now performing on stream. Formation of natural-gas hydrates, with a freezing point above that of water, is effectively eliminated by adsorptive dehydration. Thus maintenance and repair are minimized and, at the same time, corrosion is reduced.—Chem Eng, Oct, p149

HYPERSORBERS will find more uses in hydrogen and synthesis gas purification and in acetylene recovery



OPERATING GALLERY of a multiple-adsorber solvent-recovery installation has adsorbers installed at the left and operating controls at the right



METAL-CLOTH STRAINERS for refrigerators, engines, injectors, hydraulic systems are made by weaving and . . .

Seam-Welding Metal

Strainers of metal cloth are protecting aircraft fuel lines, filtering out plasma powder particles in battlefield transfusions, doing sentry duty in peace time too

METAL CLOTH is not new. It has been made for many years by crimping, soldering, welding. Today the emphasis is on seam welding, which produces clean, economical, strong joints in a variety of materials.

Steel, galvanized steel, brass, bronze, Monel, stainless steel, Inconel, Nichrome, and other alloys can be welded into a durable woven metal cloth. For instance, a Monel strainer made by Michigan Wire Cloth Co. operates at 700° F. under considerable pressure and has never failed.

Welded joints of nearly 100% strength are made regularly in Monel, mild steel, and stainless steel. Joints in low-brass, phosphor bronze, and certain other copper alloys average about 75%.

Peacetime applications run into the hundreds—in automobiles, airplanes, ships, home appliances, industrial equipment. The light types of strainers shown are for: 1, 2, and 5—home and commercial refrigerators, 3—industrial injector, 4—hydraulic system, 6—industrial pipe line, 7—gasoline engine, and 8—agricultural sprayers. Plain square-weave cloth handles most straining jobs. Wires are as far apart as 1 in. or as close together as 250 openings per inch. Wires run from 0.0016 to ¼ in. in dia.

More difficult straining jobs require a Dutch weave, which is heavier, denser, stronger. An 80x700 twilled Dutch weave will retain particles 0.0012 in. in dia.

Michigan Wire Cloth Co. uses modified 7½-kva. air-operated seam welders. Rolled wire mesh is fitted over arbor and joined by a pure copper welding wheel. Other wheels tried but found unsatisfactory included a molybdenum-tired wheel, a molybdenum-copper wafer (sandwich) wheel, and aluminum-bronze wheels.

Pressure-regulating equipment and airmotor devices keep forging pressure at five times the line pressure. Heat control also must be maintained precisely. Bitter experience with low-brass alloys has shown that phase-shift heat control is necessary when welding this material.

A simple test shows whether the welding setup is satisfactory. The operator rolls the welded cylinder back and forth between her palms with a slight pressure. If the weld is poor, the flexing action will rupture it. At the same time, the operator checks for holes and loose strands.—Weld Eng, Nov, p42

Commercial Taconite In Full Production

Reserve Mining Co.'s huge holdings of magnetic taconite at Babbitt, Minn., are at last beginning to yield their iron. The company now has in an early stage of operation its preliminary commercial-scale plant at Babbitt. The plant is regarded as the first section of the ultimate 10-million ton plant also being erected by Reserve at Lakeside. Annual output of the Babbitt plant is 300,000 tons.

Coarse crushing of the mined ore will be done at the mine for both the Babbitt section and the big plant at Lakeside. The primary crusher will be the world's largest, with a 60-in. receiving opening and a 109-in. maximum diameter crushing cone. It will crush 3,500 tons per hour and handle pieces 5 ft. on one dimension.

The crude ore is reduced in a two-stage crushing plant at Babbitt from chunks as large as 1 cu. yd. down to less than 4-in. pieces. This product will be shipped to the Lakeside plant when it is built, and there crushed to about ¾-in. size. It will then be further reduced in 10x12-ft. rod mills. This is followed by magnetic separation, with the rejection of a tail that is mostly silica. The magnetic concentrate is then ground in ball mills and is subjected to a second stage of magnetic separation of tailings. The remaining magnetic material is washed in a hydroseparator to remove the silica which is slightly magnetic, but it has too much silica to warrant processing further.—Eng & Min J, Nov, p72

Latest Disk-Cathode Developments Reviewed

Recent electronic research and development at Superior Tube Co. have made significant advances in disk cathodes used as a source of electrons in cathode-ray picture tubes. The disk cathode is a sleeve material, crimped or fastened to a ceramic disk, hence the name. Electrons are emitted from the top surface of the device.

Manufacturing techniques have been perfected for maintaining during long production runs a tolerance of ±0.0005 in. on the critical distance between the ceramic surface and the surface of the electron-emitting cap. More efficient alloys for emission caps have been developed. Sublimation-effect leakage of electrons across the ceramic disk of the cathode and heater-to-cathode electron leakage have been reduced. Heater shrinkage from improper insertion during assembly has been eliminated.

These basic innovations now readies the disk cathode for more stringent electronic tasks.—Electronics, Nov, p236

Graphic-Panel Control

As food processes become more complex, manufacturers face trouble in training operators. Corn Products Refining Co. faced this situation in its development of its wet-milling system, so it adopted an approach new to the food processing industry.

The continuous process is outlined by a graphic control panel, showing silhouetted layouts of the process, plus superimposed working miniatures of the instrumentation. With the graphic panel before him, the operator can watch the over-all operation.

He can watch the rise and fall of the product in huge vessels, the speed of flow through scattered pipelines, the gradient of temperatures along a 50-ft. column.

The panel so simplified the process control that one operator can supervise all five evaporating sets involved in the process. Evaporator down-time has been minimized because of the simplified trouble-shooting.—Food Eng, Nov, p84

IN SWEDEN

CLARK HELPS CUT THE PRICE OF PEAS

In Sweden, a young and lusty pioneer in the food processing field is the Findus organization. The short, cool summer that results from Sweden's northerly latitude means that fresh vegetables and fruits are available for a relatively short time during the year. Findus has attacked the problem of getting the most and the best possible produce out of that limited growing season, and at the lowest possible price to the consumer.

Up-to-the-minute equipment, including CLARK fork-lift trucks; purchased through A/B Bygg- och Transportekonomi, technical skill that is progressive and precise, and an aggressive and far-sighted research program, constitute the cornerstone of Findus' success.

Take canned peas, for example. As fast as the peas are cut, they are loaded mechanically into trucks which rush them to the viner station, where they are threshed, washed and pumped directly into the modern, immaculate canner. Total elapsed time from vine to can: three hours at most!

In Findus' record of increasing productivity and efficient machine techniques, it is natural that CLARK materials handling equipment should play a significant role. CLARK fork-lift trucks fit the Findus scheme of things: speed, economy, and safety—in other words, cutting the cost of handling.

Throughout the world CLARK representatives are showing customers the economical way to solve handling problems. For the name of your dealer, write to Clark Equipment Company, Export Division, Battle Creek, Michigan.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

EXPORT DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 73, MICHIGAN, U.S.A.

Please send: ☐ Material Handling News ☐ Condensed Catalog

Name

Firm Name

Street

City Country

PRODUCTION IDEAS

from Manufacturers' Catalogs

1–1 Hoists and Derricks—American Hoist & Derrick Co. 16p. Vol. 18 No. 5 of "The American Crosby Clipper" features use of the special American steel erector's guy derrick in setting up catalytic cracking plant.

1–2 Building Materials—Johns-Manville Corp. 40p. Catalog G1-6A 5–51 gives properties, sizes, and applications of complete line of building materials such as insulation, electrical products, roofing, gaskets, flooring, and many others.

1–3 Coating Resins—Carboline Co. 4p. Carbo-Kote 6020, a furan base thermosetting resin for lining tanks and protecting mechanical equipment against corrosion, is covered in bulletin 500.

1–4 Electrical Equipment — Crouse-Hinds Co. 64p. Electrical-equipment design for hazardous locations is detailed in bulletin 2631. Bulletin 2627 covers condulets for hazardous locations. Hazardous locations are defined in accordance with the 1951 National Electrical Code.

1–5 Advanced Handling — Towmotor Corp. 4p. How Towmotor equipment cut handling costs at P. Lorillard's tobacco plant is told in Job Study No. 115.

1–6 Wood Borers—B. M. Root Co. 10p. Bulletin 190 covers Style KH horizontal single-spindle borer. Style KH-250 dowel borer with hydraulic feed is described in bulletin 191. Bulletins describe application of borers for drilling masonite, bakelite, and other composition materials.

1–7 Grain Processing—Link-Belt Co. 16p. Conveying, processing, and power transmission machinery for grain milling and processing industries are described in book 2392.

1–8 Hydraulic Presses — Hydraulic Press Mfg. Co. 60p. Part I of bulletin 5208 deals with all-hydraulic fast-traverse presses for ordnance, such as shell forging, and armor-plate quenching presses. Part II covers other H-P-M presses and available engineering consulting services.

1–9 France—The National City Bank of New York. 16p. Informative booklet on French tourist attractions, modern industry, and foreign-trade pattern.

1–10 Air Hose—International B. F. Goodrich Co. 4p. Several types of air hose with tough oilproof covers are described in catalog 3460.

1–11 Alkyd-type Resins—Monsanto Chemical Co. 14p. Technical Data Report TX-10 covers styrene modified alkyd-type resins that can be formulated as baking enamels or air-drying enamels.

1–12 Ion-exchange Equipment—Dorr Co. 4p. The Dorrco d-i exchanger cell for process industries is illustrated in leaflet 4082. Featured are the level control and air dome system, and special underdrain assembly.

1–13 Electric Fork Truck—Lewis-Shepard Products, Inc. 12p. Catalog features "J" model electric fork truck in receiving, production, feeding, shipping and warehousing operations.

1–14 Induction Motors—Allis-Chalmers Mfg. Co. 14p. Large vertical induction motors, large pedestal-bearing induction motors, and squirrel-cage induction motors are described in catalogs 05B7629, 05B7771, and 51B6210D.

1–15 Literature Index—Minneapolis-Honeywell Regulator Co. 20p. Bulletin Index 100-A consists of a numerical listing and alphabetical cross index for specification sheets, instrumentation data sheets, catalogs, and other literature available from the company's Industrial Division.

1–16 Power Equipment—Worthington Corp. 24p. Catalog WP-1099-B47A lists all products manufactured by Worthington and its domestic subsidiaries and gives condensation of broad scope of applications. Also lists addresses of all representatives outside the U. S.

1–17 Electric Tractor—Yale & Towne Mfg. Co. 4p. Booklet P-996 gives details of Model MT Yale Worksaver heavy-duty electric tractor for industrial towing.

1–18 Grinding Machine—Landis Tool Co. 4p. Bulletin CB-52 gives specifications of new 30-in., 36-in., and 48-in. Type CHW plain grinding machine for large diameter work.

1–19 Plunger Pumps—Pacific Pumps, Inc. 32p. Specifications and technical data on plunger pumps for deep oil-well service are contained in catalog 110-A. Accessories are also listed.

1–20 Heavy Equipment Guide—Hyster Co. 16p. Cartoon-style brochure, "A Story of Tractor Tools and Their Uses", illustrates use of tractor-mounted tools in all basic industries, such as railroading, construction, logging.

1–21 Heavy-duty Detergent—Pennsalt International Corp. 4p. Service bulletin 21 explains how Pensal W works to remove heavy soils and greases from greasy overalls, oil wipers, and mop towels.

More Production Ideas on Next Page

For Free Catalogs, Mail This Coupon Before March 1, 1953

McGraw-Hill Digest (January 1953)
330 W. 42nd St., New York 36, N. Y., U. S. A.

I have filled in the squares with catalog numbers desired.

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Name.....Title.....

Company.....

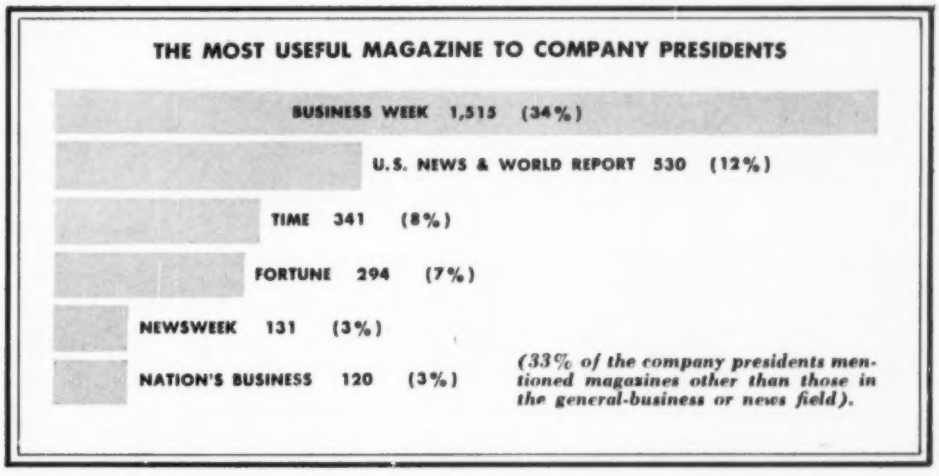
Street.....

City.....Country.....

"What one magazine do you consider most broadly useful to you as a management man in business?"

On three separate occasions, three different research organizations have asked this one question of the presidents of America's largest companies, listed in Poor's Register of Directors and Executives. In 1944 the survey was conducted by Ross Federal Research Corporation; in 1950 by Crossley, Inc.; in 1952 by Erdos & Morgan Research Associates. In each of these three studies conducted over an eight year period Business Week was selected as the outstanding first choice by these important business executives.

Here are the results of the latest survey made in May, 1952 among the presidents of 19,867 of America's leading companies. 4,517 replies were received, a return of 22%.


THE MOST USEFUL MAGAZINE TO COMPANY PRESIDENTS
BUSINESS WEEK 1,515 (34%)
U.S. NEWS & WORLD REPORT 530 (12%)
TIME 341 (8%)
FORTUNE 294 (7%)
NEWSWEEK 131 (3%)
NATION'S BUSINESS 120 (3%)
(33% of the company presidents mentioned magazines other than those in the general-business or news field).

This consistent, year-after-year record of usefulness fully demonstrates Business Week's ability to bring your advertising to the attention of America's important management men—the men who initiate, specify and approve major corporate purchases.

SEND FOR YOUR FREE COPY OF "THE NEXT TEN YEARS"

This special Business Week report, based on a study made by the McGraw-Hill Department of Economics, indicates what American industry may be *buying*, *making* and *selling* during the next 10 years. It is a valuable aid to those who sell—or plan to sell—in the rich American market. Send your request to . . .

BUSINESS WEEK A McGRAW-HILL PUBLICATION
330 West 42nd Street, New York 36, N. Y.

More Production Ideas

1–22 Drum Sander—Carborundum Co. 4p. Bulletin A-1217 illustrates how abrasive strips are placed around Cone-Loc Drum Sanders, a grinding and polishing wheel that never loses diameter.

1–23 Reduction Gears—Elliott Co. 8p. Bulletin H-19 describes new line of high-speed reduction gears for mechanical drive turbines. Gears are available in built-in or coupled designs.

1–24 Flexible Coupling—De Laval Steam Turbine Co. 4p. Complete information on construction, horsepower ratings, speeds, applications, and selections are given in bulletin 2200.

1–25 Process Pumps—Ingersoll-Rand Co. 16 p. Catalog 7094-A covers construction details and applications of single-stage vertically split refinery and process pumps. Featured are Class SFLA pumps for handling light refinery liquids at temperatures to 250° F.

1–26 Turbine-blade Grinder—Pratt & Whitney Div., Niles-Bement-Pond Co. 4p. Illustrations and specifications of Turbine Blade Airfoil grinder are given in Circular 551.

1–27 Industrial Tires—Monarch Rubber Co. 28p. "Monarch Catalog and Handbook of Industrial Tires" lists types of tires; tells how to get more ton-miles per tire; and gives specifications of various sizes. It also gives equipment specifications for a dozen makes of vehicles.

1–28 Pump Castings—Meehanite Metal Corp. 20p. Photographs of pump castings and the various types of pumps that utilize Meehanite castings are found in bulletin 36, plus tables and charts illustrating property evaluation tests for corrosion, wear, and impact resistance.

1–29 Grinders and Buffers—Hisey-Wolf Machine Co. 34p. Catalog 72 gives specifications of buffing and polishing machines, combination grinders and buffers, dust collectors and hoods, eye shields, and grinding machines. It also lists their attachments and accessories.

1–30 Preventive Maintenance—Westinghouse Electric International Co. 28p. Booklet B-5477 gives complete outline of institution of preventive maintenance for any industry. It deals particularly with power equipment.

1–31 Metal Framing—Unistrut Products Co. 78p. Specifications, applications, and general information on Unistrut flexible all-purpose metal framing are given in catalog 700. List of parts and accessories used with framing is also given.

1–32 For Packing—Jeffrey Mfg. Co. 8p. Jeffrey-Traylor electric vibrating packers and packing tables for packing barrels, drums, and other types of bulk containers are detailed in catalog 843.

1–33 Production Case Study—National Automatic Tool Co. 16p. Success Story No. 8 tells how Natco tools helped speed manufacturing operations in engine-block production.

1–34 Concrete Air-entraining Agent—Hercules Powder Co. 8p. Folder 400-413.D describes advantages of Vinsol air-entraining agent in concrete and lists methods used in its production.

1–35 Balancing—Gisholt Machine Co. 16p. "Static and Dynamic Balancing" by Werner I. Senger, reprinted from Tool Engineers Hand Book, First Edition, discusses nature of balancing and types of balancing machines.

ADVERTISERS IN THIS ISSUE

ALLIS-CHALMERS MANUFACTURING CO.	34	LINK-BELT CO.	2, 3
AMERICAN CYANAMID CO.	5	MINE SAFETY APPLIANCE CO.	28
ANDERSON CO., V. D.	50	NORDBERG MANUFACTURING CO.	23
BURROUGHS ADDING MACHINE CO.	4	NORTON BEHR-MANNING OVERSEAS INC.	4th Cover
BUSINESS WEEK	59	REMINGTON RAND INC.	42
GOVERNMENT OF CANADA	37	SERVEL INTERNATIONAL	19
CLARK EQUIPMENT CO.	57	SYLVANIA ELECTRIC PRODUCTS INC. (Int'l Div.)	26
DOW CHEMICAL INT'L LTD.	10	TRUSCON STEEL DIV.	47
EX-CELL-O CORPORATION	3rd Cover	WALLACE & TIERNAN CO. INC.	6
HITACHI, LTD.	8	WESTINGHOUSE ELECTRIC INT'L CO.	1
INTERNATIONAL HARVESTER EXPORT CO.	2nd Cover	YODER CO.	52

Publications Digested:

McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N. Y.

American Machinist
Aviation Week
Bus Transportation
Business Week
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Electrical Construction & Maintenance
Electrical Merchandising
Electrical West
Electrical Wholesaling
Electrical World
Electronics
Engineering & Mining Journal
E&MJ Metal & Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Fleet Owner
Food Engineering
Industrial Distribution
Machinist (London Office)
Nucleonics
Pharmacy International
Power
Product Engineering
Textile World
The American Automobile (Overseas Edition)
The Welding Engineer

Chilton Company, Chestnut and 56th St., Philadelphia 39, Pa.

Automotive Industries
Boot & Shoe Recorder
Commercial Car Journal
Department Store Economist
Distribution Age
Hardware Age
Hardware World
Motor Age
The Iron Age
The Jeweler's Circular Keystone
The Optical Journal & Review of Optometry

Dartnell Publications, Inc., 4660 Ravenswood Ave., Chicago 40, Ill.

American Business

Fritz Publications, Inc., 431 S. Dearborn St., Chicago 5, Ill.

The Paper Industry

Industrial Publications, Inc., 5 South Wabash Ave., Chicago 3, Ill.

Ceramic Industry

Modern Packaging Corp., 575 Madison Ave., New York 22, N. Y.

Modern Packaging

Modern Plastics, Inc., 575 Madison Ave., New York 22, N. Y.

Modern Plastics

Petroleum Publishing Co., 211 S. Cheyenne Ave., Tulsa 1, Okla.

The Oil and Gas Journal

Simmons-Boardman Publishing Corp. 30 Church St., New York 17, N. Y.

American Builder
Marine Engineering & Shipping Review
Railway Age
Railway Engineering & Maintenance
Locomotive and Cars
Railway Signalling & Communications

McGraw-Hill World News Bureaus: *London, Paris, Frankfurt, Tokyo, Bombay, Melbourne, Mexico City, Rio de Janeiro, Stockholm and 60 other industrial cities.*

EX-CELL-O

Blade Machining Equipment

NOW AVAILABLE

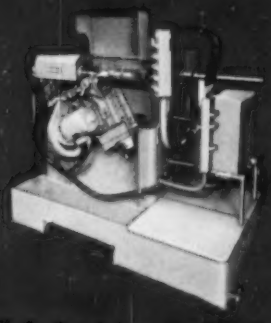
Compressor blade for turbojet aircraft engine.

XLO

EX-CELL-O for PRECISION

Three Production-Proved Machines Mill, Grind and Polish Airfoil Forms

Ex-Cell-O Precision Profile Miller, Style 86, mills the complete airfoil form including leading and trailing edges. Work is supported rigidly by back rests throughout the cutting stroke.



Ex-Cell-O Precision Profile Grinder, Style 87, grinds the complete airfoil form including leading and trailing edges. Work speed changes automatically during rotation as area of contact between wheel and work varies.

Ex-Cell-O Precision Profile Polisher, Style 88, polishes the airfoil form with an abrasive belt which passes over a rubber pulley at point of work contact.

The complex job of finishing the airfoil form of compressor blades for jet aircraft engines is now done speedily, accurately, and automatically by three Ex-Cell-O standard machines. Production-proved, these machines mill, grind, and polish, respectively, with completely automatic machining cycles. Operator merely loads, unloads, and pushes start button. For further information and specifications contact Ex-Cell-O in Detroit, U.S.A.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN, U. S. A.

CABLE ADDRESS: XLO DETROIT, U. S. A.

MANUFACTURERS OF PRECISION MACHINE TOOLS CUTTING TOOLS • RAILROAD PINS AND BUSHINGS DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

the world's most complete line of abrasive products

NORTON offers you over 500,000 possible grinding combinations

True to its aim of placing in the hands of industry *better products to make other products better, Norton* is continually devoting itself to research and experimentation. That's why it has to its credit more "firsts" in the field of abrasives than any other company in the world. That's also why you may be sure of quality and economy, precision and durability, safety and confidence when you purchase abrasive products bearing the famous NORTON trade-mark. There is a Norton grinding wheel or abrasive product that's exactly right for each of your grinding, sharpening, and polishing operations.

O.D. GRINDING — You can get NORTON O.D. wheels in the abrasives, grain sizes and bonds for best results on every material. They're sure protection for your big investment on O.D. grinding machines.

POLISHING AND LAPPING — ALUNDUM® grain comes in surface treatments and grain sizes for best results on every polishing job. And precise sizing makes ALUNDUM and CRYSTOLON® abrasives favorites for even the fussiest lapping jobs.

SURFACE GRINDING — You will find NORTON wheels, cylinders, segments and discs unbeatable for fast, cool cutting action. Use 32 and 38 ALUNDUM abrasive on all hardened steels and CRYSTOLON abrasive on gray iron and non-ferrous metals.

ROUGH GRINDING—For rough grinding on swing-frame, floorstand or portable grinders, NORTON wheels "hog that work" to cut time and costs. And NORTON Reinforced Hub Wheels are the safest, most versatile ever made!

FOR GRINDING "KNOW-HOW"

Send for your copy of *"A Handbook on Abrasives and Grinding Wheels,"* a very complete and helpful booklet on the subject. Profusely illustrated, it deals in detail with the thousands of NORTON products—showing how to use them to your advantage for every conceivable grinding job. You will find your free copy of this handbook invaluable. Write us for it direct and while you are at it, tell us if you have any grinding problems which we may help you solve. Or get in touch with our representative in your territory . . . no obligation, of course!

Making better products to make other products better

NORTON BEHR-MANNING OVERSEAS INC.

Worcester 6, Mass., U.S.A., Cables: "NORBEMO, Worcester"

NORTON BEHR-MANNING

*Trade-marks registered in U. S. A. and foreign countries